Technical Section Abstracts

NOTE: Abstracts of posters follow abstracts of podium presentations by section.

A. Zoology
Only Morning at 9:45 am
SATURDAY, APRIL 27, 1991
University Hall 024
Miles Coburn, Presiding

9:45 AMPHIBIANS AND REPTILES OF FOUR HAMILTON COUNTY PARKS. David Rubin. Department of Biology, Central State University, Wilberforce, OH 45384

From 1988 to 1990, four Hamilton County parks were surveyed for amphibians and reptiles. Field work was supplemented by library search, examination of museum specimens, and personal interview. Parks studied were Embshoff Woods (226 acres), Shawnee Lookout Park above the Lawrenceburg Road (773 acres), Woodland Mound Park (920 acres), and Miami-Whitewater Forest (2262 acres). Numbers of species recorded were 10, 14, 20, and 27 respectively. Herpetological diversity was positively correlated with park size and general ecological diversity. The cave salamander (Eurycea lucifuga), endangered in Ohio, was recorded from Embshoff Woods and from several sites in Miami-Whitewater Forest. Other significant records include dusky (Desmognathus fuscus) and slimy (Plethodon glutinosus) salamanders at Woodland Mound Park and the worm snake (Carphophis amoenus) at Miami-Whitewater Forest. Red-backed salamander (Plethodon cinereus) or ravine salamander (P. richmondi) was recorded from each park but no park yielded both. Hamilton County parks serve as important reservoirs for amphibians and reptiles. Greatest danger to continued viability of park populations comes from park development and private development of bordering land. Amphibian and reptile populations at Miami-Whitewater Forest do not appear adversely affected by proximity to the Fernald Nuclear Enrichment Plant.

10:00 THE DISTRIBUTION OF CAMBARUS (JUGICAMBARUS) MONONGALENSIS ORTMANN (DECAPODA: CAMBARIDAE) WITH COMMENTS ON ITS TAXONOMIC STATUS, LIFE HISTORY, AND HABITAT. G. Whitney Stocker, 13773 Bodle Rd., NE, and Raymond F. Jezerinac, The Ohio State University at Newark, University Dr., Newark, Ohio 43055.

Two disjunct populations of Cambarus (J.) monongalensis exist. One population is confined to the mountains of West Virginia and Virginia and the other to the Appalachian Plateau in West Virginia and Pennsylvania. Though 178 specimens were examined, there were no statistically significant morphometric (13) or meristic (2) characters that differentiated the populations other than size. The plateau populations tended to have larger chelae, longer dactyls, shorter palms, and the areola is longer and narrower than the mountain populations. The populations on the plateau also have either an obtuse or an absent suborbital angle and the ventrolateral margin of the merus of the first pereiopod usually has one spine, whereas the mountain populations usually have an acute suborbital angle and the merus usually has two or three spines. The mountain populations inhabit springs and seeps, whereas the plateau populations inhabit wooded hillsides and occasionally seeps. First form males are probably present year round and the majority of females probably extrude their eggs sometime between January and April, but can be as late as July. The plateau populations collects leaves of deciduous trees and herbaceous plants as food. The diet of the mountain population is unknown.

10:15 A NEW SUBGENUS AND NEW SPECIES OF CRAYFISH (DECAPODA: CAMBARIDAE), WITH AN AMMENDED DESCRIPTION OF THE SUBGENUS LACUNICAMBARUS. Raymond F. Jezerinac, Department of Zoology, The Ohio State University at Newark, University Drive, Newark, Ohio 43055.

A new subgenus of crayfish and a new species are described. The new subgenus differs from the subgenus Lacunicambarus in having one-third to one-fourth of the palm of the chelae studded with tubercles, the dactyl to palm length is always < 1.8, and a subpalmar tubercle is usually absent. The new species is most closely related to Cambarus (Lacunicambarus) acanthura Hobbs but differs from it in that the distomedian spine on the mesial ramus of the uropod does not overreach the rounded margin of the ramus and the merus always has a well developed spiniform tubercle on the anterior ventral articulation rim. The species occurs in Kentucky, Ohio, Pennsylvania, Tennessee, and West Virginia.

10:30 SYSTEMATICS OF Notropis volucellus AND Notropis wickliffi (CYPRINIDAE: PISCES) FROM OHIO WATERS. Lixin Gong and Ted M. Cavender, Museum of Zoology, The Ohio State University, 1813 North High Street, Columbus, Ohio, 43210

Since its description, the channel shiner, Notropis wickliffi, has been considered a subspecies of the mimic shiner, Notropis volucellus. A definitive morphological analysis of the two forms via multivariate and univariate techniques revealed that the two forms are distinct species. Discriminant function analyses classified the two species 96-99 % correctly.
Within Notropis volucellus, the variation in morphometric and meristic characters was significant among populations of the same major drainage basin and between basin populations. Some characters, such as vertebral number, number of lateral line scales, number of predorsal scales, caudal peduncle depth, and predorsal length, exhibited north-south clines. These were correlated with latitudinal environmental variables such as temperature and light. Due to the great divergence of morphological characters across its range, more taxonomic forms could be revealed within "Notropis volucellus" than currently recognized if a total geographic analysis was conducted.
In Ohio, the two species, Notropis volucellus and Notropis wickliffi, had similar biological characters, such as age and growth, fecundity and reproductive season but possessed distinctly different habitats. The Ohio River was found to be the exclusive domain of N. wickliffi.

10:45 MONITORING FISHES OF THE OHIO RIVER. Ted M. Cavender and Judith K. Cavender, Museum of Zoology, The Ohio State University, 1813 North High Street, Columbus, Ohio, 43210.

Fish collections were made with a bag seine at 105 boat launching ramps distributed along the length of the Ohio River as part of a study to test the ability of ramp sampling to monitor the river's fish populations. Ramps are fairly evenly distributed on both sides of the river in both channel margin and backwater habitats. The technique was especially effective at capturing data on young-of-the-year, was efficient in actual collecting time expended (<0.5 man hours per sample) and was rich in information on the distribution and relative abundance of fish taxa. Sixty-seven species and two hybrid combinations were identified from more than 18,000 individuals sampled between river miles 43.5 and 980.9. Forty seven species were recorded upstream from Markland Dam (RM 531.5) and 49 downstream. Significant records include the Mississippi silverside, Menidia beryllina. Captures at RM 973.1, 951.1, 942.5 and 881.0 are apparently new records for the Ohio River and indicate this species is extending its range upstream from its previous reported occurrence (circa 1975) at the Ohio-Mississippi River confluence.

A. Zoology
Only Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 024
Miles Coburn, Presiding

2:00 ANALYSIS OF MITOCHONDRIAL SEQUENCE VARIATION IN ENDANGERED SPECIES OF LAKE VICTORIA CICHLID FISH. Gregory C. Booton*, Doug Warmolts+, Sandy Andromeda+, Paul A. Fuerst*. *The Ohio State University, Dept. of Molecular Genetics, 484 W. 12th. Ave., Columbus, Ohio 43210, and +The Columbus Zoo, 9900 Riverside Drive, Powell, Ohio 43065.

Recent developments in molecular techniques such as the Polymerase Chain Reaction (PCR), and DNA fingerprinting have provided researchers with powerful methods to examine underlying genetic variation of populations, as well as the taxonomic relationships between and among species. We are using these methods to examine the genetic variation of endangered African Cichlid fishes, which are being propagated in captivity at the Columbus Zoo.

Lake Victorian cichlid fishes make up a large species flock of some 250+ species. This large association of closely related species represents a burst of speciation of interest to evolutionary biologists due to the relatively short period of time in which it occurred (less than one million years). The opportunity to study these species, and their evolutionary history is now threatened. The introduction of a non-native predator fish (the Nile perch), pollution, and overfishing have combined to threaten the entire assemblage with extinction. To preserve these species for research, and possible re-introduction to the native environment, a species protection plan has been formulated. Our present genetic studies are part of the implementation of this plan.

A preliminary step in our examination of genetic variation in these species is the analysis of DNA variation of informative mitochondrial genes: cytochrome b, ribosomal RNA genes, and the D-loop control region. These sequences are being determined from PCR generated products using conserved vertebrate primers. As a result of this and other work, we hope to develop a captive breeding scheme which will maximize the retention of genetic variation in these fish, and may be applicable to other endangered species of fish.

2:15 ECDYSONE 20-MONOOXYGENASE ACTIVITY DURING LARVAL-PUPAL-ADULT DEVELOPMENT OF THE TOBACCO HORNWORM MANDUCA SEXTA. John R. Crooks, Martin J. Mitchell, Daniel P. Keogh and Stan L. Smith, Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403.

Molting and metamorphosis in insects are regulated in part by ecdysteroids, polyhydroxylated ketosteroids which function as molting hormones. The principal molting hormones in insects are ecdysone, the secretory product of the prothoracic glands, and its more physiologically active metabolite 20-hydroxyecdysone. The enzyme system responsible for the conversion of ecdysone to 20-hydroxyecdysone is a cytochrome P-450 dependent steroid hydroxylase called ecdysone 20-monooxygenase. Using a radioassay, we have measured the levels of ecdysone 20-monooxygenase activity during embryogenesis in the egg, and in the fat body and midgut tissues during the fourth larval, fifth larval, and pupal-pharate adult stadia of the tobacco hornworm, Manduca sexta. Ecdysone 20-monooxygenase activity was detected in all stages of development examined. Although this steroid hydroxylase activity was low during embryogenesis, significantly high levels of ecdysone 20-monooxygenase activity were found in the fat body and midgut of the postembryonic stages. A single major fluctuation of midgut and fat body enzyme activity was noted for both tissues in each of the stadia, but these fluctuations were tissue specific and not temporally coincident with one another or the major fluctuations in the hemolymph ecdysteroid titer. Accordingly, it would appear that the role of ecdysone 20-monooxygenase in ecdysteroid titer regulation, as well as the regulation of this enzyme system, is tissue specific and reasonably complex. Supported by NIH (AI20604), OBOR, FRC, BioMed, and Sigma Xi grants.

2:30 EFFECTS OF DIBUTYRYL CYCLIC AMP, DIBUTYRYL CYCLIC GMP AND CALCIUM IONS ON INSECT CYTOCHROME P-450 DEPENDENT STEROID HYDROXYLASE ACTIVITY. Daniel P. Keogh, Ekem T. Efuet and Stan L. Smith. Department of Biological Sciences, Bowling Green State University, Bowling Green, OH 43403

Ecdysone 20-monooxygenase is the cytochrome P-450 dependent steroid hydroxylase responsible for the conversion of the insect molting hormone ecdysone to its more physiologically active metabolite 20-hydroxyecdysone. Similar to the vertebrate cholesterol side chain cleavage system, this insect P-450 system appears to be regulated in a tissue specific fashion by transcriptional, translational and posttranslational factors and processes. In this study we examined the effects of dibutyryl cyclic AMP, dibutyryl cyclic GMP, calcium ions, and the calcium ionophore A23187 (alone and in combination) on midgut ecdysone 20-monooxygenase activity during larval-pupal development of the tobacco hornworm, Manduca sexta. Preincubation of midgut tissue with dibutyryl cyclic GMP elicited substantial increases in ecdysone 20-monooxygenase activity compared to untreated controls; dibutyryl cyclic AMP, calcium ion or A23187 alone were without effect. By contrast, calcium ions coincubated with either A23187 or dibutyryl cyclic AMP elicited dramatic decreases in enzyme activity; and calcium ions coincubated with dibutyryl cyclic GMP abolished the cyclic GMP increase. These data are consistent with a model that dibutyryl cyclic GMP exerts a stimulatory effect on midgut monooxygenase activity, whereas calcium ions exert an inhibitory effect. Dibutyryl cyclic AMP, A23187, or dibutyryl cyclic GMP presumably mediate this calcium inhibition by facilitating the entrance of this ion into the intact midgut cell. Supported by NIH (AI20604), OBOR, FRC, BioMed, and Sigma Xi grants.

2:45 THE ALLOMETRY OF COOLING, SUPERCOOLING AND FREEZING IN THE FREEZE-TOLERANT TURTLE, CHRYSEMYS PICTA. Peter A. Zani & Dennis L. Claussen. Dept. of Zoology, Miami Univ., Oxford, Oh. 45056.

Although several vertebrates are freeze tolerant, little is known of the relationship between body size and the kinetics of cooling and freezing. We compared these responses for six hatchling and eight adult Chrysemys picta from a single Ohio population. All turtles initially recovered from freezing, and all adults, but only two hatchlings (which experienced ice contents of about 35%), exhibited long-term survival. Rapid thawing may have compromised hatchling survival. Turtle water content was inversely related to body mass, but we found no significant correlation between the extent of supercooling and body size. Pre-freezing and post-freezing cooling rates scaled with body mass to the -0.55 and -0.40 power respectively, but the latter rate was more than two orders of magnitude slower. Theoretical (assuming 20% bound water) and caliometric estimates of body ice agreed reasonably well. Ice contents were both body mass and time dependent. The absolute rate of ice formation scaled with body mass to the 0.4 power. Body size strongly influences the freezing response of ectotherms and deserves more attention.

3:00 THE ESOPHAGUS OF PORCELLIO SCABER AND TRACHEONISCUS RATHKEI (CRUSTACEA: ISOPODA: ONISCOIDEA). Roger L. Lane. Kent State University, Ashtabula Campus, Ashtabula, OH 44004.

The lumen of the esophagus is nearly circular at its origin, becoming folded into a star-shaped appearance as it progresses dorsad before emptying into the cardiac stomach. The lumen is lined by a 2-5 um thick chitinous intima that is produced by the short columnar to cuboidal epithelium of the esophageal mucosa. The mucosa is subtended by a thin lamina propria. The intrinsic muscularis ranges in thickness from 10 to 15 um. The fibers are arranged in a circular pattern. At the esophageal-cardiac stomach boundary, the muscularis increases in thickness. A series of extrinsic muscles run between the esophageal wall and apodemes of the skeleton. These muscles are 7-15 um in diameter and vary in length from 75 to 400 um. They lie in the antero-posterior, transverse, and antero-lateral planes. A thin, parenchymatous serosa forms the outer layer of the esophageal wall. The chitinous intima prevents abrasion of the mucosa. The musculature propels ingested food material toward the stomach region and prevents regurgitation of the material as it is macerated in the stomach.

A. Zoology
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

Board A @ 10:00 **YOHIMBINE HCl AUGMENTS WEIGHT GAINS AND SIGNIFICANTLY INCREASES EGG PRODUCTION IN CHICKENS (*GALLUS GALLUS*)**

Edward L. Erb and Alan B. Cady. Dept. of Zoology, Miami Univ.-Middletown, 4200 E. Univ. Blvd., Middletown, OH 45042

Yohimbine HCl is an alpha-2 adrenergic antagonist commonly used to treat impotence. It decreases inhibition of norepinephrine and increases peripheral circulation. Claims that Yohimbe (herbal Yohimbine HCl) mimics anabolic steroids (1) has prompted its use by athletes. This study investigated the effects of Yohimbine HCl on muscle mass development. Three groups of eight young (23 week) female domestic chickens (Gallus gallus) were used in order to eliminate interference from natural steroids found in males, and they also respond well to steroidal effects. One group was treated orally with 0.5 mg/kg Yohimbine HCl (Aphrodyne), another group was injected intramuscularly with 5 mg/kg of a steroid (testosterone cyponate, Virilon; both substances from Star Pharm. Pompano Beach FL), and the third group (control) was treated with saline (both routes). Food and water were available ad lib.; the birds given oral treatments daily and injections every other week for seven weeks.

Yohimbine HCl produced weight gains greater than the control group and similar to, but lower than, gains seen in the steroid group. Yohimbine ingestion induced a sig-

nificant increase in egg production. The steroid treatment predictably decreased the rate of egg laying. These results indicate that Yohimbine HCl not only inhibits alpha-2 andrenoreceptors, but may also mimic or stimulate gonadotropins. Alternatively, muscle mass increases may result from enhanced peripheral circulation. The exact mechanisms behind these results are still unknown.
1 Universal Labs, 3 Terminal Rd. New Brunswick, NJ 08901

Board B @ 10:00 TEMPERATURE EFFECTS ON REPRODUCTION IN THE RED-SPOTTED NEWT, (NOTOPHTHALMUS VIRIDESCENS).
C. J. V. Smith, Mira Lee, and Linda L. Baranowski-Smith, The University of Toledo, Toledo, OH 43606.

Ifft (Biol. Bull. 33:111-128, 1942) reported that environmental temperature is important in regulating reproduction in the red-spotted newt. Male newts collected in May (pond temp. 15°C) and placed at room temperature (20-25°C) showed increased spermatogenesis, while the testes of newts placed at low temperatures (1.5-8°C) showed no change. We repeated some of Ifft's work and also examined the possible role of fat-bodies in testicular growth. Eighty-six male newts were collected in mid-April (water temp. 10°C). Six animals were euthanatized as an initial control group. The remaining animals were distributed into two groups, one kept at 10°C and the other at 20°C. Half of each group were fed and half were starved. Within each subgroup the fat-bodies were removed from half of the newts. The animals were maintained for 5 weeks after which they were euthanatized, measured and weighed. Fat-bodies and gonads were removed and weighed. Considerable variation was evident within each experimental group. Gonadal weight was not significantly affected by food availability, temperature, or the presence of fat-bodies. Trends in fat-body and gonadal weight were evident and will be discussed.

Board C @ 10:00 INVENTORY OF THE NITIDULID BEETLES AT THREE NATURAL PRESERVES IN PORTAGE COUNTY. Roger N. Williams, Jackie Blackmer, Douglas S. Richmond and M. Sean Ellis. Department of Entomology, Ohio Agricultural Research and Development Center of The Ohio State University, Wooster, OH 44691.

A comparative study among three habitat types was conducted from early May through late October of 1990 to determine if habitat type influenced the abundance and number of nitidulid species. The sites were selected because of their diverse and dissimilar flora, and because of their proximity to each other. The sites were Gott Fen, a calcareous marl bog; Kent bog, an acid peat bog; and Tinker's Creek, a large marsh and swamp forest. Eight collecting techniques were utilized to document the population of sap beetles (Coleoptera: Nitidulidae) at each site. Of the approximately 30 species collected, a few are awaiting determinations. A total of nearly 25,000 nitidulid beetles frequented the traps during the studies. Most species (ca. 25) were obtained at Kent Bog, 19 at Tinker's Creek, and 14 at Gott Fen: this was also true for the number of specimens taken at each site. Nine species were considered rare (where less than 5 specimens were collected in all habitats combined over the entire season).

B. Plant Sciences
First Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 056
Allison Snow, Presiding

9:00 FACTS AND FICTION ABOUT GAMETOPHYTIC SELECTION IN PLANTS. Allison A. Snow[1] and Timothy P. Spira[2]. [1]Dept. of Plant Biology, Ohio State Univ., 1735 Neil Ave., Columbus, OH 43210; [2]Dept. of Biology, Georgia Southern Univ., Statesboro, GA 30460.

Studies of cultivated plants suggest that pollen tube competition fosters selection for more vigorous progeny genotypes. The mechanisms involved are not well understood, but many investigators now assume that gametophytic selection has been important in angiosperm evolution, and continues to operate in existing populations. I will review the evidence for and against this assumption, and discuss a new approach for investigating the role of pollen tube competition in natural populations. This process could be important, not because of effects on sporophytic vigor, but because individuals with fast-growing pollen tubes sire more seeds than those with slower-growing tubes. Our studies of Hibiscus moscheutos demonstrate that "super-males" occur in natural populations. The evolutionary implications of this variation in pollen tube growth rates will be discussed.

9:30 EFFECT OF SOIL NUTRIENT LEVEL ON SIZE DISTRIBUTION IN AN EXPERIMENTAL RADISH (RAPHANUS SATIVUS L.) POPULATION
Robert A. Klips, Dept. of Plant Biology, The Ohio State University, Columbus, OH 43210

A greenhouse experiment was conducted to test the hypothesis that dominance and suppression, resulting in the establishment of a size hierarchy, are more likely to occur in a plant population having an adequate supply of soil nutrients. The distribution of fresh mass was compared for radish plants grown at 2 densities and two levels of fertilizer application at three successive harvests. As measured using the Gini coefficient, inequality in size distribution increased over time for all combinations of fertilizer and density, suggesting that some degree of size hierarchy may be attributable to intrinsic variability among individuals in lognormal growth rate. However, the highest Gini coefficient occurred under conditions of high density with high nutrients, suggesting that a skewed size distribution, presumably due to competition for light, is most likely to occur when members of the population are not limited by nutrients. Since resources other than light may often be present at sub-optimal levels, dominance and suppression in natural communities may be less common than is generally believed.

9:45 CONTROL OF NUTRIENT RETRANSLOCATION IN WILD CRANESBILL (GERANIUM MACULATUM). Ralph E.J. Boerner, Department of Plant Biology, Ohio State University, 1735 Neil Avenue, Columbus, OH 43210.

Retranslocation of nitrogen and phosphorus from leaves prior to litterfall is an important process for conserving often scarce nutrients. Although prior studies have demonstrated increasing retranslocation with decreasing soil fertility in a number of canopy species, understory species are subject to limitation by both light and nutrient availability. To determine what factors most strongly influence retranslocation in understory species, Geranium maculatum plants were grown in a factorial design with high vs understory light intensities, VA mycorrhizae present vs absent, and at low vs high N+P supply rate. Phosphorus retranslocation was lowest in mycorrhizal sun plants, regardless of nutrient supply rate. Mycorrhizal shade plants given low nutrient supply had the highest P retranslocation rates. Complete hierarchic analyses of N and P retranslocation in relation to these three factors will be presented and the implications for ecophysiological strategies discussed.

10:00 THE COMPARATIVE GROWTH RATE OF JUGLANS NIGRA (BLACK WALNUT TREES) AS CORRELATED WITH AVAILABLE NUTRIENTS, AND AS AFFECTED BY SUPPLIMENTAL NITROGEN, BORON, AND MANGANESE
Spencer David Grond, 16017 Scott Road, Bryan, OH 43506

The surviving fifty plants of a 20 year old planting of 400 plus walnut seeds were observed to vary widely in their growth rate. Soil and foliar analysis determined that one nutrient (nitrogen) was deficient, and that two micro-nutrients (boron and manganese) had high correlation coefficients (.980, and .805) with growth rate. Varying supplemental amounts of these three nutrients were applied to attempt to determine the optimum rate of application. The micro-nutrients either alone, or together, retarded the growth, but nitrogen alone effected increased growth rate. Nitrogen in combination with specific amounts of the micro-nutrients effected even greater growth.

10:30 OZONE AND NITRATE DEPOSITION EFFECTS ON THE PHYSIOLOGY OF ACER SACCHARUM. Amy J. Scherzer[1] Keith F. Jensen[2], and R.E.J. Boerner[1], [1]Department of Plant Biology, The Ohio State University, Columbus, OH 43210, [2]U.S.D.A. Forest Service, 359 Main Road, Delaware, OH 43015.

Although the impact of tropospheric ozone and acidic deposition on woody plant species has been studied over the last decade, there is still a lack of understanding of how plants perceive and respond to interactive stresses. We hypothesized that over the long term, interactive effects of ozone and nitrate deposition may result in reductions in allocation of carbon to roots and mycorrhizae, and reduce end-of-season carbohydrate stores. In addition, increases in leaf and root nitrate reductase activity and leaf peroxidase activity would be at the expense of root carbohydrate reserves. Such reductions in allocation of carbon to roots can result in reduced growth and overall fitness, and increased susceptibility to drought and nutrient stress. To test these hypotheses, sugar maple seedlings were fumigated with ozone and treated with nitrate deposition in a 4x3 factorial design for two growing seasons. Ozone treatments included charcoal filtered air, ambient ozone, or ambient ozone ± 15%. Nitrate treatments were the equivalent of 10, 20, and 40 $kg.ha^{-1}.yr^{-1}$ of nitrate deposition. One half of the nitrate was added in the spring to simulate winter deposition. The remaining portion was applied in equal doses spread throughout the growing season. At the end of the second growing season, subsamples of fresh leaf and root tissue were used to determine nitrate reductase and peroxidase activity. The remaining tissues were dried and used for biomass determination and root carbohydrate analysis. Results of these experiments will be presented.

10:45 ALLYL ISOTHIOCYANATE RELEASE AND THE ALLELOPATHIC POTENTIAL OF BRASSICA NAPUS L. Devi N. Choesin and R.E.J. Boerner. Department of Plant Biology. The Ohio State University. Columbus, OH 43210.

The allelopathic potential of Brassica species has been attributed to their release of mustard oil glycosides which upon hydrolysis yield compounds with strong antibiotic properties. The objective of this study was to assess whether Brassica napus is capable of allelopathic interference, and if so, whether its glycoside derivative, allyl isothiocyanate (AI), is capable of producing this interference. Wild type and low glucosinolate mutant B. napus were grown at low and high P and S levels. P significantly influenced growth whereas genotype and S supply influenced AI release. Wild type plants released more AI than mutants. Growth of the target plant, Medicago sativa, was not affected by additions of AI to soils at concentrations similar to those found in B. napus soils. In replacement series, the two B. napus genotypes suppressed growth of M. sativa equally despite differences in AI release rate. The two B. napus genotypes were equal competitors intraspecifically. Under our experimental conditions, B. napus showed no indication of being allelopathic and AI concentrations typical of soils around B. napus did not inhibit target plants.

B. Plant Sciences
Second Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 066
Michael Garroway, Presiding

9:00 THE EFFECTS OF ROOTING ON FLORAL TIMING IN SUNFLOWER IN A STERILE CULTURE SYSTEM
Amy Menning, Biology Department, Kenyon College Gambier, Ohio, 43022.

The effects of rooting on floral timing in sunflower were studied on 5-day shoot apex explants in a sterile culture system. One experiment investigated the effects of the cytokinin benzyl adenine on the number of leaves produced. In a second experiment, the effects of continous root removal on leaf number were studied. A third experiment was conducted to study the effects of early rooting, induced with the addition of napthaleneacetic acid or NAA, on floral timing. In order to determine the mode of action of NAA, one group was treated with NAA and was also subjected to root removal. The mean number of leaves produced by explants treated with benzyl adenire was not significantly higher (P = .059) than the number produced by the untreated controls. The mean number of leaves produced by those explants whose roots were removed was significantly (P = .0019) but not markedly lower than the intact controls. Therefore, although this experiment demonstrated a correlation between rooting and floral timing, the nature of this correlation remained unclear. The number of leaves produced by explants treated with NAA was significantly higher (P = .018) than the number of leaves produced by the controls. The NAA-root-removal explants produced a mean number of leaves comparable to that seen in the untreated controls, suggesting that the amount of rooting affects the number of leaves produced.

9:15 RESPONSE OF WHEAT GROWTH AND CO_2 ASSIMILATION TO ALTERING ROOT-ZONE TEMPERATURE. S. H. Al-Hamdani and D. A. Francko, Department of Botany, Miami University, Oxford, OH 45056.

Wheat plants (Triticum aestivum L. var. Chisholm) grown at an air temperature of 23°C and a root-zone temperature of 3°C exhibited a significant reduction in shoot and root dry weight and leaf area compared with plants grown at a root-zone temperature of 23°C. This reduction was correlated with a significantly lower CO_2 assimilation rate that was associated with lower leaf conductance, lower internal CO_2 concentration, and more negative water potential. Low CO_2 assimilation rate was also associated with high starch and total soluble sugar levels in the shoot, less translocation of photosynthate, and possibly less sink demand. Leaf chlorophyll concentration was not affected by altering the root-zone temperature, whereas water use efficiency of plants grown at a root-zone temperature of 3°C was as much as 1.5 times higher as those grown at 23°C.

9:30 CHARACTERISTICS OF CUTICULAR PROTEIN IN ODONTOTAENIUS DISJUNCTUS. John T. Sawvel and Eric Nelson, Ohio Northern University, Ada, OH 45810; Stephen L. Gunderson and Rebecca Schiavone, University of Dayton Research Institute, 300 College Park, Dayton, OH 45469-0168.

Previous studies have evaluated the cuticle of Odontotaenius disjunctus and compared and contrasted its constituents and their organization to man-made advanced polymeric composites. Both consist of fibers embedded in a matrix which can be crosslinked (thermosets). Unlike man-made composites, the matrix characteristics of O. disjunctus vary through the thickness with density increasing from inner to outer regions. The current study focused on the protein matrix and dense epicuticular material, with particular emphasis on theoretical contributions to the characteristics of the composite cuticle as a whole. Elytra of O. disjunctus were analyzed by normal and fluorescent light microscopy to determine the characteristics of the matrix and epicuticular material. A novel thin-sectioning technique was used in conjunction with Mallory-Heidenhain's stain to differentiate the matrix. Unstained specimens were evaluated under fluorescent light. Results indicate that the most dense portion of the matrix lies directly below the epicuticle. The epicuticular material, distinctly different and more dense than the matrix, extends through the trabeculae which are surrounded by chitin fibers.

9:45 EFFECT OF PROTEINS FROM MAIZE LEAVES ON THE ACTIVITY OF THE HOST-SPECIFIC TOXIN PRODUCED BY THE FUNGUS BIPOLARIS MAYDIS RACE T. M. O. Garraway, Department of Plant Pathology, The Ohio State University and OARDC, Columbus, OH 43210.

Polypeptides were present with other metabolites in leachates from infected leaves of normal (N) and Texas male sterile (T) cytoplasm isolines (cv. W64A) of maize, resistant and suceptible, respectively, to the fungus Bipolaris maydis race T (BMT). More of these constituents leaked from leaves exposed to environmental or chemical stress than non-stressed leaves. Also, more constituents leaked from detached T cytoplasm, than from N cytoplasm, leaves following infiltration with the host-specific toxin (BMT-toxin) produced by the fungus. Therefore, the effect of polypeptides from maize leaves on the activity of BMT-toxin was studied by measuring electrolyte leakage from detached infiltrated T cytoplasm leaves. Infiltration of leaves with BMT-toxin plus maize proteins (≥ 2 ug/ml) or other polypeptides including Bovine serum albumin (66 kD) and myoglobin (14-16 kD) significantly reduced BMT-toxin activity, indicating that several types and sizes of polypeptides could be involved. Also, dialysis experiments with Bovine serum albumin indicated that inhibition of BMT-toxin activity may involve non-specific binding of toxin to proteins.

10:00 ANASTOMOSIS GROUPINGS AND VIRULENCE OF RHIZOCTONIA SOLANI ISOLATES FROM MUCK-GROWN LETTUCE WITH BOTTOM ROT. Leonard J. Herr, Dept of Plant Pathology, OSU/OARDC, Wooster, OH 44691

Definitive morphology is lacking in anamorphs of Rhizoctonia and teleomorphs may include isolates with a range of pathogenic and cultural types. Anastomosis groupings (AG) have been systematized by others and have a genetic basis in intraspecific groups (ISG). Fifty-one fungal isolates from diseased Romaine, green leaf, red leaf lettuce and escrole crops at Celeryville were paired with standard AG tester isolates and the kinds and numbers of ISG were ascertained: 34 AG-1-1B, 10 AG-1-1C, 2 AG-2-2 and 3 AG-4. Isolates were assayed for virulence on three lettuce types (Romaine, Boston and red leaf) in two greenhouse tests differing in plant age (28 d vs. 34 d) at infestation of soil with the putative pathogens. ANOV indicated plant age effects were N.S. On a 1-3 disease rating scale (DR), Romaine was the most susceptible, DR=2.42; Boston intermediate, DR=2.16; and red leaf, DR=1.75 least susceptible to all isolates. The 51 isolates were grouped into six virulence ranges: maximum, high, moderate, weak, minimum and avirulent. AG-1-1B isolates included the most virulent (14 in max range), but as with the other AG some occurred in other categories. Rankings of the other AG(by highest virulence values) were AG-2-2 > AG-1-1C ≯ AG-4. Source of AG-1-1B, considered a southern (warm climate) U.S.A. group, is being investigated.

10:15 ASSOCIATION OF GRAMINELLA NIGRIFRONS AND THE SPREAD OF MAIZE CHLOROTIC DWARF VIRUS WITH CLIMATE. R.J. Anderson and R. Louie. Agric. Res. Service, U.S. Dept. of Agric. and Departments of Entomology and Plant Pathology, respectively. OSU-OARDC, Wooster, OH 44691.

Field populations of Graminella nigrifrons (GN), the principal vector of maize chlorotic dwarf virus (MCDV), were monitored during twenty growing seasons. GN were monitored with a Johnson Taylor trap, modified with an 18-inch blacklight. The natural spread of MCDV was monitored with a row of 50 pots of infected 21-day old Oh28 corn plants placed between two rows of 25 each of 14-day old Oh28 trap plants and exposed for weekly intervals in a field plot for 16-20 weeks. Temperature and rainfall affected the numbers of GN caught and the spread of MCDV reflected this population change. Few GN were trapped in the summer drought of 1988, resulting in a 20-fold reduction of GN (14/day) trapped when compared to the previous year. Also few GN were caught when temperatures were below 50F or during rainy periods when rains occurred in late afternoons to early evenings. MCDV spread generally peaked at 30% infections in July 17-August 5, and this coincided with the increase in numbers of GN which peaked at 31-1035/day in late July to early August.

B. Plant Sciences
First Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 056
Tod Stuessy, Presiding

2:00 POLLINATION ECOLOGY OF PEDICULARIS MEGALANTHA (SCROPHULARIACEAE) IN THE HIMACHAL HIMALAYA. Lazarus Walter Macior, Department of Biology, University of Akron, Akron, Ohio 44325-3908

An investigation of the yellow-flowered Pedicularis megalantha in the Himachal Himalaya did not support a hypothesis that long-tubed Pedicularis flowers are pollinated by long-tongued, nectar-foraging lepidopterans. P. megalantha was pollinated exclusively by Bombus albopleuralis and B. tunicatus workers vibrating pollen from anthers concealed within the galea and contacting the stigma protruding from its tip with the ventral thorax. P. megalantha corolla tubes (24.5mm) lack both nectar and nectaries. Corbicular pollen loads from its pollinators indicated a pollen-foraging fidelity of 91% in B. albopleuralis and 30% in B. tunicatus. Insect behavior was recorded by close-range stereophotography. In one plant community, Pedicularis pollinators foraged alternately for nectar on Geranium wallichianum, Torenia cordifolia and Halenia elliptica, while in a second community they foraged for pollen and/or nectar on Cynoglossum wallichii and virtually ignored Pedicularis. Numerous haustoria on P. megalantha roots indicated its root hemiparasitism common to all other species thusfar studied. Of four Pedicularis species listed for the research area in Flora Simlensis (1921), only P. megalantha was located suggesting possible eradication by heavy grazing by domestic animals. This study is part of a comprehensive investigation of the functional coadaptation of Pedicularis floral mechanisms and their animal pollinators.

2:15 THE CAPSICUM PUBESCENS COMPLEX: NOTES AND OBSERVATIONS. W. Hardy Eshbaugh. Department of Botany, Miami University, Oxford, OH 45056.

Capsicum pubescens Ruiz. & Pav. (Solanaceae) is a domesticated chili pepper species cultivated at mid-elevation altitudes in the Andes. The purported wild ancestral species complex is recognized as C. eximium, widely distributed in Bolivia and Argentina, and C. cardenasii, a localized endemic of the Department of La Paz, Bolivia. Recent field studies have added insights into the relationships of the domesticated/wild Capsicum pubescens complex. When these observations are coupled with data from laboratory studies a meaningful understanding of evolution in this domesticated species complex emerges. An understanding of cropping patterns of domesticated Capsicum pubescens also suggests a role for this species in the United States drug eradication policy in Latin America.

2:30 THE CUSHION HABIT AND THE GENUS MULINUM PERS. (APIACEAE). James C. Zech. The Ohio State University, Department of Plant Biology, 1735 Neil Avenue, Columbus, Ohio 43210-1293.

The cushion habit represents one of the most extreme morphologies of the flowering plants. The habit is defined by reduced internode length, which leads to the charcteristic compact, flat growth-form. Cushion plants occur in alpine communities in Alaska, Africa, Tasmania, and New Zealand, but are most conspicuous in the Andes of South America. This life-form has been adopted by many species from different plant families. The cushion habit is clearly an adaptation to environmental extremes and several factors, including altitude, temperature, and an association with bud protection, have been presented as stimuli for cushion formation. Several taxa of the genus Mulinum display the cushion habit. Factors affecting the formation of the cushion habit within Mulinum were explored and comparisons with other cushion taxa were made. Cushion species of Mulinum are unique because they occur at both high and low elevations. Species also share common habitat compositions of full sun, cool to low temperatures, high wind, and poor soils. A suite of factors are believed responsible for cushion formation within Mulinum with strong winds being the primary force. This differs from previous studies which have emphasized altitude and temperature as the primary factors in cushion formation.

2:45 ELECTROPHORETIC VARIATION IN POPULATIONS OF CERCIS (LEGUMINOSAE) FROM NORTH AMERICA. J. A. Ballenger, W. H. Eshbaugh, R. J. Hickey, and S. I. Guttman. Department of Botany, Miami University, Oxford, OH 45056.

The genus Cercis consists of small trees or shrubs which occur in four geographically disjunct regions of the North Temperate Zone. Eight species are recognized, one in southeastern Europe, five in China and two in North America. Starch gel electrophoresis was employed to examine isozyme variation among populations in North America. A total of 43 populations throughout the range were collected by sampling 20 individuals from each population. Eight enzymes encoded by 12 loci have been found to be consistently active and scorable. A posteriori analysis of enzyme data was employed to determine the extent of genetic similarity among the 43 populations. These clusters were analyzed for the presence of unique alleles and correlated with historically recognized morphological taxa. The combination of enzymatic and morphological data indicate that there are several distinctive elements in North America. The types and patterns of character variation differ remarkably between the eastern and western population centers. In the west, population clustering appears most significantly to be determined by variation in enzyme characters and geography. In the east, populations are less disjunct and tend to be enzymatically similar. However, a number of eastern groups can be recognized using more traditional morphological characters.

3:00 **ALLOZYME VARIATION WITHIN AND BETWEEN POPULATIONS OF COREOPSIS INTERMEDIA (ASTERACEAE). Mary Beth Cosner. Department of Plant Biology, 1735 Neil Avenue, The Ohio State University, Columbus, Ohio 43210.**

Genetic diversity in two populations of the rare endemic, Coreopsis intermedia (section Coreopsis), was estimated using enzyme electrophoresis. Coreopsis intermedia contains greater genetic diversity than has been reported for many other narrowly distributed species. Levels of genetic variation in C. intermedia are similar to those of the other eight species in section Coreopsis, and greater than that of the rare congener, C. latifolia (section Silphidium). Phylogenetic history may account for the high genetic diversity within C. intermedia. The two populations, which consisted of greatly different numbers of individuals, contained comparable levels of genetic diversity.

3:15 CAREX DISPERMA: RECENT DISCOVERY OF HISTORICAL RECORD AND EXTANT POPULATIONS FOR OHIO
Beverly W. Danielson, The Cleveland Museum of Natural History, Cleveland, Ohio

Carex disperma Dewey, a native species of boreal regions to the north of Ohio, was added to the flora of Ohio in 1987 when a previously unreported 19th century specimen was found within the Case Western Reserve University Herbarium while merging that collection into the Herbarium of The Cleveland Museum of Natural History. Until acquired by the Museum in 1985, the 9,000 specimen, historic CWRU collection had been inaccessible to researchers for decades. The CWRU specimen of Carex disperma was collected at Sippo Lake in Stark Co. by Edo Claasen in 1896. Braun, in The Monocolyledoneae (1967), had listed this species as "erroneously reported from Ohio". Subsequent to the discovery of the historical specimen, active search for this plant by the Museum Botany Department resulted in discovery of extant populations at Penn Line Swamp, Ashtabula Co. in 1987 and Dollar Lake, Portage Co. in 1989. At both sites this sedge was found on Sphagnum flats. Concurrent Museum field surveys yielded ten populations in northwestern Pennsylvania.

3:30 HENRY SHAW'S PATH FROM SHEFFIELD TO MILL HILL SCHOOL AND THE FOUNDING OF THE MISSOURI BOTANICAL GARDEN. Emanuel D. Rudolph, Department of Plant Biology, The Ohio State University, Columbus, OH 43210.

Henry Shaw, born in Sheffield, England in 1800, grew up in a Dissenter family of the middling classes engaged in the cutlery business. Industrial Sheffield was dirty, and often depressed in his childhood. As a teenager he attended the new Dissenter public school, Mill Hill School, near London, which had been Peter Collinson's 18th century estate, and still retained some exotic trees planted by him. Shaw cultivated a garden at the school that influenced his later interest in gardens. As an immigrant to St. Louis in 1819 Shaw established a profitable hardware business using his family connections for supplies, and the newly expanded river traffic from New Orleans to deliver goods for the ever enlarging St. Louis market. Retiring from active business in 1840, he began plans for a country estate with a large garden. By 1859, those plans had changed to include a public botanical garden, the Missouri Botanical Garden, chartered by the State. Shaw's relationship with William and Joseph Hooker at the Royal Botanic Gardens, Kew; Asa Gray at Harvard University; and George Engelmann in St. Louis was vital in establishing and developing the Garden, and was essential for its planning, implementing, and future managing.

3:45 EDGE OF APPALACHIA VEGETATION CLASSIFICATION USING SPOT SATELLITE IMAGERY.
J.R. Strittholt, Center for Mapping and Department of Plant Biology, The Ohio State University, Columbus, Ohio 43210.

Modern mapping of large regions for planning and management purposes involves the use of many developing technologies. Satellite imagery has been shown to be extremely useful, for it provides timely visual data over large areas with little image distortion. SPOT satellite imagery was chosen for this study for it provides a high degree of spatial resolution (20m) while supplying enough spectral diversity to be useful in differentiating land cover, particularly vegetation classes. Vegetation classification using satellite imagery does not replace quality ground analysis; rather, it furnishes a more generalized view of an area, and once representative plant communities are identified, can be further examined by more traditional ecological approaches. This paper examines the use of satellite imagery in classifying and mapping specific plant communities in and around The Nature Conservancy's Edge of Appalachia preserve system in Adams County, Ohio. Data obtained through this study are to be incorporated into a broader GIS preserve design analysis for this biologically rich area of Ohio.

4:00 THE VEGETATION OF THE HOOVER NATURE PRESERVE, DELAWARE COUNTY, OHIO. Mary Anne Elizabeth Hay, School of Natural Resources, The Ohio State University, Columbus, Ohio 43210.

The Hoover Nature Preserve is an approximately 200 hectare site near Hoover Reservoir in Genoa and Berkshire Townships, Delaware County, Ohio. The condition of the site has been largely shaped by human activity. It is a complex of reservoir and stream floodplain woods, upland woods, old fields and pastures, thickets, groves, wet meadows, streams, springs and ponds on a mosaic of fourteen, mostly acidic, alfisols, mollisols and inceptisols. Nearly four hundred species of vascular plants were cataloged for abundance and distribution. A few are uncommon in Ohio, many are ruderal and most are indicative of the generally moist, acidic soil. Reproduction of established floodplain tree species is stable within most stands. Greenhouse experiments show that seeds of the vascular plant species are much more widely distributed than expressed. Moisture, shade and soil acidity most influence seed expression and the establishment of a vegetation type. The relationships between vegetation types and site factors are shown by ordination diagrams.

4:15 A STUDY OF THE WILDFLOWERS OF BLACKLICK METROPOLITAN PARK AT REYNOLDSBURG, OHIO. By Dr. Terrill J. Long, Biology Department, Capital University, Columbus, Ohio 43209 and Ms. Leslie A. Rawlings, Naturalist, Blacklick Metropolitan Park, Reynoldsburg, Ohio 43068

The wildflower populations of Blacklick Metropolitan Park were studied to obtain information on flowering dates, species present and their location in the park. The major trails and habitats were examined once each week from the last week in February until the middle of October when frost occurred or the wildflowers died. The wildflowers were identified, their positions mapped and the dates recorded. No endangered or rare species were found. Extensive deer browsing damage was observed with some species. Several maps will be distributed showing habitat, time of flowering and location. With the current data and earlier studies it is possible to determine where the wildflowers will be in future years and when they are likely to occur, especially in woodland areas.

4:30 POLYGONUM CAESPITOSUM: AN ASIAN INVADER IN THE WETLAND FLORA OF THE EASTERN UNITED STATES
Anne Kochman, The Ohio State University, 503 Fawcett Center, 2400 Olentangy River Road, Columbus, Ohio 43210

Polygonum caespitosum var. longisetum, bristly ladysthumb, (Polygonaceae) has small, pink flowers and long bristles on the ochrea and bracts. First recorded near Philadelphia in 1910, it had spread to southern states by the 1960s and west to Omaha, Nebraska, by 1986. It is a rice paddy weed in parts of its natural southeast Asian range, but in the U.S. inhabits roadside ditches, stream and canal banks, gardens, and footpaths in cities and towns. Harold N. Mohldenke (Torreya 1941, 1946) reviewed U.S. herbarium specimens showing its spread to eastern seaboard cities from Massachusetts to Delaware. Nearly 40 years later, it had spread west to Chicago, south to Alabama and Arkansas, and north to Michigan. In Ohio, it was first discovered at Pond Run in Scioto County by Floyd Bartley in 1951. Its known Ohio distribution is mostly southeastern, ranging northwest to Franklin and Champaign Counties, and also Lorain County. When the plant's distribution is plotted on the U.S. Plant Hardiness Zone Map, its westward spread is mainly in the zone with annual minimum temperatures of -10° to 0°F and warmer southern zones. Infrequent in the next colder zone north, it is common in warmer areas around the shores of the southern Great Lakes.

B. Plant Sciences
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

Board D @ 10:00 A COMPARISON OF AUXIN AND ABSCISIC ACID TRANSPORT PATTERNS IN GRAVISTIMULATED ROOTS OF MAIZE. L.M. Young and M.L. Evans. Department of Biological Sciences, Ohio Northern University, Ada, OH 45810 and Department of Plant Biology, The Ohio State University, 1735 Neil Ave., Columbus, OH 43210.

There is a strong correlation between asymmetric auxin movement across the cap and the rate of gravicurvature in maize roots. Since ABA has also been implicated in root gravitropism, we compared the redistribution of IAA and ABA during maize root gravitropism. Lateral movement of ^{3}H-ABA across the tips of vertical roots was non-polar and about 2-fold greater than lateral movement of ^{3}H-IAA (also non-polar). The greater movement of ABA was not due to greater uptake since the uptake of ^{3}H-IAA was 5-fold greater than uptake of ^{3}H-ABA. Basipetal movement of IAA and ABA was compared by measuring activity in successive 1 mm sections behind the tip. ABA accumulated in the first mm (point of application) while IAA accumulated 2-4 mm from the tip. The poor basipetal movement of ABA may explain the large lateral movement of ABA described above. The data indicate that tip applied IAA is readily transported basipetally and that stimulation favors movement of IAA toward the lower side of the cap. In contrast, basipetal movement of ABA is poor and stimulation does not induce asymmetric lateral movement of this hormone. These results are consistent with the hypothesis that IAA mediates root gravitropism.

Board E @ 10:00 EFFECTS OF CHILLING ON GLUTATHIONE AND NADP(H) LEVELS IN TWO VARIETIES OF SOYBEAN AND ALASKAN PEA LEAVES
Thomas L. Vierheller & Ivan K. Smith, Department of Botany, Ohio University, Athens, OH 45701

Previous studies have shown that a chill-sensitive cultivar (FFR 332) of soybean (Glycine max (L) Merr) accumulates oxidized glutathione when exposed to chilling temperatures (5°C) for 3 weeks, despite the presence of large amounts of glutathione reductase. A less chill-sensitive soybean variety from Switzerland (Silvia) also accumulated higher levels of oxidized glutathione. This is in contrast to peas (Pisum sativum (L) Alaska), in which chilling increased total glutathione two-fold but did not lower the GSH/GSSG ratio. In both varieties of soybean and pea plants total nicotinamide adenine dinucleotide phosphate levels decreased in chill and control growing conditions; however, the NADPH/NADP+ ratio was not significantly affected.

Board F @ 10:00 CALCIUM EFFLUX IN CORN ROOT MICROSOMES PREPARED FROM BOTH FROZEN AND FRESH VESICLES. J.B. McCormick and L.M. Young. Department of Biological Sciences, Ohio Northern University, Ada, OH 45810.

There is considerable evidence supporting a role for calmodulin root gravitropism. This is a report on the progress made to date on an experiment which examined the effect of calmodulin antagonists (chlorpromazine (CPZ) and calmidazolium (CMZ) on Ca^{++} and auxin (IAA) flux patterns in root microsomes (prepared from fresh and frozen root tissue). This was accomplished via monitoring $^{45}Ca^{++}$ and ^{3}H-IAA transport, respectively. In the presence of CMZ, higher $^{45}Ca^{++}$ movement was observed. Similar results were seen in the presence of CPZ. The movement of ^{3}H-IAA in the presence of CPZ and in the presence of CMZ was less than control ^{3}H-IAA efflux.

Board G @ 10:00 GYPSY MOTH CONSUMPTION OF OZONE-FUMIGATED WHITE OAK FOLIAGE. W. N. Cannon, Jr. and J. H. Barger. USDA Forest Service, 359 Main Road, Delaware, OH 43015.

White oak, Quercus alba L., seedlings were exposed to simulated ozone treatment regimens based on 1988 ambient ozone concentrations at Parsons, WV. The targeted treatments were charcoal-filtered air (CFA); 0.85X, 1X, and 1.15X the Parsons ozone levels. Leaf discs, taken 6 times between late June and mid August, were fed for 48h to 2nd-instar gypsy moth larvae, Lymantria dispar (L.). The leaf area consumed was measured with a leaf area meter, and compared with the ozone doses received by the seedlings. The simulated ozone regimens proved to have no effect on the area of leaf tissue consumed by the gypsy moth larvae. There was an expected decrease in leaf area consumed as the leaf tissue matured. This was not altered by any of the ozone treatments.

C. Geology
First Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 082
John Szabo, Presiding

9:00 THE LA ROCQUE LEGACY 1909-1990 - THE EARLY YEARS
Mark J. Camp Department of Geology University of Toledo, Toledo, OH 43606

A son was born to Marie-Aimée Haspeck and Joseph Alfred La Rocque April 26, 1909 in a house on St. Patrick St. in Ottawa, Ontario.

Aurèle La Rocque received his first lessons in natural history in the third class Guigues School. He then spent four years at LaSalle Academy where he was introduced to the mollusks when one of the teachers gave him a small collection of freshwater shells. One of the brothers at LaSalle Academy was instrumental in leading Aurèle to his second job, one that would establish his life's profession. In 1927, Aurèle was introduced to Dr. Edward M. Kindle, head of the paleontological division of the Canada Geological Survey who was searching for a museum assistant. His first assignment was to classify a microscope slide collection by taxa. The slides included specimens prepared by such pioneers of Canadian geology and paleontology as G.M. Dawson, W.E. Logan, F.J. Whiteaves, and Elkanah Billings. The unpacking, sorting, labeling, and filing of summer field specimens for Dr.'s Wilson, Kindle, McLearn, and W.A. Bell, became Aurèle's second museum task. Another early job was the sorting and filing of Dr. Kindle's extensive reprint collection. Observations of all types of restorative techniques used by museum personnel were to play an important part in shaping Aurèle's own contributions to the field of paleontology.

Dr. Aurèle La Rocque passed away November 5, 1990.

9:15 EARLY PALEOBOTANICAL RESEARCH IN OHIO.
Aureal T. Cross, Department of Geological Sciences, Michigan State University, East Lansing, MI 48824-1115

E. Granger first reported fossil plants from near Zanesville, Ohio in 1821. These were mainly from Putnam Hill locality Tionesta-Brookville coal interval. Additional specimens along with drawings were sent by Granger and W. A. Adams to Adolph Brongniart in Paris, who illustrated several of them in his 1828 classic "Histoire de Vegetaux Fossile". Many more were illustrated by S. G. Morton in S. P. Hildreth's "Observations on the Bituminous Coal of the Valley of the Ohio ..", along with fossils from several other localities. Hildreth also illustrated, with a classic woodcut, and described the "Grotto of Plants", early Dunkard age, near Marietta, in that volume. He had reported on fossil trees from near Gallipolis in 1827. S. Gazlay reported widely distributed Pleistocene wood in lakebeds near Springfield and Cincinnati in 1833. Silicified tree fern trunks (Psaronius), abundant along Shade Creek, Athens Co., were reported by Hildreth in 1838. Those in eastern Monroe and Belmont Counties were first reported by Herzer in 1897. In the 1850-60 period, J. S. Newberry and C. Whittlesey described many plants from several coal strata in NE Ohio in a number of papers. In 1871, W. Dawson first described Devonian wood (Callixylon) sent to him from the Ohio Black Shale near Columbus by Newberry. He also first described the Tasmanites in these shales as Sporangites. E. B. Andrews described the remarkable Rushville flora with its Megalopteris-Taeniopteris plants in 1875 near the base of the Pennsylvanian. Extensive reports followed in 1873-78 in Ohio Geological Survey Reports 1-3 and in Lesquereux' "Coal Floras", in 3 volumes, 1879-80.

9:30 Ontogeny and variation in the ostracode Glyptopleura costata (McCoy, 1844) (Mississippian, Chesterian) from Ohio
R. D. Hoare
Department of Geology, Bowling Green State University, Bowling Green, Ohio 43403

Large collections of Glyptopleura costata (McCoy) from the Maxville Limestone of central Ohio contain five instars, including adults. The instars provide a basis for understanding the development of the complex ornamentation of ridges characteristic of Glyptopleura. Dimorphism is prominent with heteromorphs and

tectomorphs readily identifiable, primarily in the adult instar. Progressive development of the ornamentation in juvenile instars, significant variation in adults, and dimorphism has resulted in proliferation of proposed taxa.

9:45 RECENT SCIENTIFIC CORE DRILLING IN WESTERN OHIO: SIGNIFICANCE OF THE OXFORD AND ELKHORN CORES FOR THE INTERPRETATION OF THE EVOLUTION AND NATURE OF THE ORDOVICIAN SEBREE TROUGH. Stig M. Bergström, Dept. of Geol. Sci., The Ohio State Univ., Columbus, OH 43210; Gregory Schumacher, Ohio Geol. Surv., Fountain Sq., Columbus, OH 43224; and Charles E. Mitchell, Dept. of Geol., SUNY at Buffalo, NY 14260.

The Sebree Trough is a more than 900 km. long, linear feature that can be traced in the subsurface from central Ohio through southeastern Indiana and western Kentucky to northwestern Tennessee. It is located just northwest of, and is subparallel to, the Cincinnati Arch-Jessamine Dome-Nashville Dome. The trough rocks consist of deeper-water siliciclastics that lack benthic fossils, and these rocks differ strikingly from the shallow-water carbonates with rich benthic faunas in the arch and dome areas. As a part of a joint project between The Ohio State University and the Ohio Geological Survey, two wells were drilled in the central part of the trough to study its evolution. Analysis of the cores, combined with data from other Ohio and Indiana wells, indicates that the Sebree Trough became established in O. ruedemanni Zone time and existed into early G. pygmaeus Zone time, a period of about 7 million years. The data at hand suggest that the trough may be a flexural basin formed on the continent-ward side of a peripheral bulge in response to nappe loading of the cratonic margin in eastern North America during a phase of the Taconic orogeny.

10:00 PETROGRAPHIC EXAMINATION OF VERTICAL SEQUENCES OF MODERN CARBONATE LAGOONAL SEDIMENTS, GRAHAMS HARBOR, SAN SALVADOR, BAHAMAS
Carney, C., Folda, C., Dept. of Geological Sciences, Wright State University, Dayton, OH 45435; Boardman, M.R., Dept. of Geology, and Cummins, H., School of Interdisciplinary Studies, Miami Univ., Oxford, OH 45056.

Graham's Harbor is a lagoon located on the northeast margin of San Salvador, Bahamas. Two sediment cores, each approximately 2.5 m in length, were collected from two distinct environments and record the lagoon sedimentary response to the Holocene rise of sea level. Each core was impregnated with epoxy, and slabbed surfaces and thin sections were examined. The lowermost 30 cm of the back-reef core is comprised of mottled brown packstone with dark brown, irregular mud clasts and bivalve shells. Above this layer, is a tan, homogeneous packstone with increasing Homotrema rubrum and decreasing bivalves. The top 80 cm is finer-grained packstone with rare clasts. This deepening-upward sediment package includes initial rapid deposition of near-reef sediment, followed by higher-energy back-reef sediment, and culminates in the quieter-water, back-reef sedimentary environment seen today.

The bottom 25 cm of the core taken from a seagrass meadow contains normal-marine molluscs and clasts of Pleistocene rock and peat in a matrix of dark brown packstone. The section grades into a tan packstone with abundant irregular clasts and disarticulated whole bivalve shells which decrease in abundance up core. The top 90 cm of sediment consists of dark brown seagrass fragments and gastropods in a matrix of fine packstone to wackestone. This vertical record is a deepening-upwards sequence including a basal paleosol overlain by sandy nearshore sediments and capped by a quieter-water seagrass meadow. The vertical sequence mimics the lateral gradation of environments present today.

10:15 TAPHONOMIC SIGNATURES AND ENVIRONMENTAL TRANSITIONS IN A HOLOCENE LAGOON, GRAHAMS HARBOR, SAN SALVADOR, BAHAMAS.
WARD, Heather, CUMMINS, Hays, School of Interdisciplinary Studies and BOARDMAN, Mark, Dept. of Geology, Miami University, Oxford, Ohio 45056

It is critically important to establish the degree to which the fossil assemblage is an accurate reflection of the original biologic community and environment of deposition. A promising technique is the "taphofacies" approach in which the observed alteration of shell material and assemblages is used to infer the environment of deposition. In part to verify the taphofacies concept, we have sampled three distinct environments (a dense seagrass meadow, a seagrass-sand transition zone and a high energy back reef location) at five-meter intervals in a shallow, high-energy carbonate lagoon located in the eastern Bahamas. The transects are all within 2 km of one another.

Molluscan remains are quantitatively scored according to taphonomic alteration. Taphonomic characteristics of shells such as breakage, accretion, roundness, abrasion, encrustation, and dissolution are used as indicators or "signatures" of the environment of deposition. We have found that taphonomic alteration of shell material is indeed a function of the environment of deposition. Taphonomic signatures from the high energy back reef location, for instance, are characterized by high degrees of abrasion and dissolution while the taphonomic signatures of seagrass communities are dominated by accretion and encrustation. Even on the small scale of just a few kilometers as represented in Grahams Harbor, a record of each distinct physical environment is preserved in the death assemblage. This technique has great promise in paleocommunity reconstruction.

10:30 PRESERVATION POTENTIAL OF CLASTIC AND CARBONATE ENVIRONMENTS: MOLLUSCAN SIZE FREQUENCY DISTRIBUTIONS FROM GRAHAMS HARBOR, SAN SALVADOR, BAHAMAS.
BOLSER, Robin, CUMMINS, Hays, School of Interdisciplinary Studies, Miami University, and BOARDMAN, Mark, Dept. of Geology, Miami University, Oxford, Ohio 45056

It is critically important to establish the degree to which the fossil assemblage as seen in the rocks is an accurate reflection of the original biologic community. Two important questions are (1) How much of the original preservable community is preserved? and (2) Are there fundamental differences in the preservation potential of carbonate and terrigenous environments? In part to address these questions, we are sampling, at three month intervals, the life and death assemblages from a wide variety of environments in a shallow, high-energy carbonate lagoon located in the eastern Bahamas.

Differences in preservation potential of carbonate and clastic environments can be determined by comparing size frequency distributions (SFDs) of death assemblages from both clastic and carbonate environments. Recent studies in Holocene, clastic marine environments have found that molluscan death assemblage SFDs were more a reflection of taphonomic processes than population dynamics and that the rate of taphonomic loss of shell material, particularly in the smallest size-classes, was very rapid. In the smallest size classes, the resulting time-averaged SFDs were under-represented in the clastic environments but not in the carbonate environments of Grahams Harbor. If these initial findings hold up, the carbonate fossil record, at least in shallow lagoon environments, may indeed provide a better record of past community inhabitants than suggested by clastic environments.

10:45 PREDATION IN MOLLUSCAN DEATH ASSEMBLAGES, GRAHAMS HARBOR, SAN SALVADOR, BAHAMAS.
ISON, Joseph, Dept. of Zoology, Miami University, CUMMINS, Hays, School of Interdisciplinary Studies, Miami University, and BOARDMAN, Mark, Dept. of Geology, Miami University, Oxford, Ohio 45056

One goal of paleocommunity analysis is to reconstruct energy flow and trophic structure of a seasonally varying living community from a time-averaged fossil assemblage. In part to address the question of trophic structure reconstruction, we have sampled, at three month intervals, the life and death assemblages from a variety of environments in a shallow, high-energy carbonate lagoon in the eastern Bahamas. The frequency of sampling permits the detection of temporal variability in predator abundance in the living community as well as potential changes in the composition of the death assemblage. Accurate comparisons of trophic structure of both the living community and time-averaged death assemblage can then be made.

Predators play an important role in community structure. In the molluscan death assemblage in Grahams Harbor, evidence of past predation consists primarily of bore holes of shells by carnivorous gastropods. Predatory gastropods selectively bore near the center below the umbo of bivalve shells and on the body whorl of gastropods. Few shells contain more than one bore hole, and bore hole size is proportional to prey size. The size frequency distribution of prey is related to mollusc size -- fewer numbers of bore holes are found in the smallest and largest size classes. This is certainly an important factor when understanding the trophic structure of a community.

C. Geology
Second Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 086
Michael Angle, Presiding

9:00 ORIGIN AND EXTENT OF THE CARBONATE ROCK "NEWBURG ZONE" IN OHIO. STROBEL, Michael L., and BUGLIOSI, Edward F., U.S. Geological Survey, Water Resources Div., 975 W. Third Ave., Columbus, Ohio 43212-3192.

The demand for ground-water supplies to accommodate population and industrial growth in Ohio has led to the need for continued exploration for sources of potable water in bedrock. A zone of high permeability referred to as the "Newburg zone" is present within the Middle to Late Silurian carbonate rocks in Ohio. Although noted for hydrocarbon and brine resources in the eastern part of the State, the

Newburg zone is a widespread source of water over much of east-central Ohio and a potential source of additional ground-water supplies. Whether the Newburg zone is interpreted as a single, continuous geologic unit across the State or as numerous, unrelated units of limited areal extent and unrelated origins depends largely on an understanding of the origin of the zone. Theories of the origin of the Newburg zone include (1) dissolution of fossils associated with Silurian reef complexes, (2) deposition of unconsolidated material on an erosional surface, (3) thrust faulting associated with tectonic activity of the Appalachian Mountains, and (4) a combination of two or more of these processes. Available data support the fourth alternative--that the Newburg zone is not a single, continuous unit but is the result of multiple processes that formed regionally unrelated zones of high permeability in rocks of Middle to Late Silurian in Ohio.

9:15 HYDROGEOLOGY OF THE SENECA CAVERNS AREA, THOMPSON TOWNSHIP, SENECA COUNTY, OHIO. Wayne Jones, James M. Raab, Ohio Department of Natural Resources, Division of Water, Ground Water Resources Section, 1939 Fountain Square, Columbus, Ohio 43224.

Thompson Township, Seneca County contains over 250 known dolines. Identification of at least 25 newly formed dolines in the past year illustrates the dynamic nature of the system. Because of poor land use practices, the ground water has become contaminated with nitrates and bacteria. To better understand the flow system of this area, the Division of Water has undertaken a hydrogeologic study as part of a nonpoint source implementation grant. The dolines present in north central Ohio are confined to the Devonian-age Columbus Limestone, which is the major karstified unit throughout Ohio. Studies conducted thus far indicated a general northerly flow of ground water. Fracture trace analyses show a preferred orientation of lineaments in a N45E direction and a conjugate set in a N45E direction. Downhole camera surveys reveal the existence of fractures that are controlled by the regional geology. Correlation of precipitation data and ground water levels indicate rapid recharge rates (less than three days). Dye trace analysis and borehole geophysics will be implemented at a later stage of the study. This hydrogeologic study will be used to determine ground water monitoring locations to verify the effectiveness of best management practices around certain dolines.

9:30 DAYTON-MIAMI WELL FIELD DEWATERING. Julianne Piskura and Michael Hallfrisch, Ohio Department of Natural Resources, Division of Water, Ground-Water Resources Section, Fountain Square, Building E-1, Columbus, Ohio 43224

Beginning in the early 1980's, residents in the upland region east of Dayton's Miami Well Field have complained of well dewatering problems. The purpose of this study is to determine if the well field is geologically and hydrologically connected with the residential wells east of the well field and to determine if the well field had any effect on the water table in the upland region. Parameters examined included geologic cross sections, static water levels, precipitation and production data. The geologic cross sections indicate that the sand and gravel deposits in the uplands are geologically connected to those in the valley. Potentiometric surface maps show an increase in the size of the well field cone of depression over time. Data from monitored domestic wells indicates that the water levels decreased with time. Monthly production totals from the well field are increasing and are independent of monthly precipitation totals.

9:45 **THE FUTURE OF REGULATORY GEOLOGY - RESEARCH, PREVENTION & REMEDIATION, Clark L. Scheerens, Ohio Department of Natural Resources, Division of Oil and Gas, 4435 Fountain Square, Columbus, Ohio 43224**

Current activity by regulatory geologists and hydrologists consists predominantly of permit application review, and investigations of problem situations after contamination has occurred. There is a growing trend for research into preventive measures based on local geologic conditions. Examples of this new emphasis include the following: 1) special permit conditions for oil and gas wells in sensitive areas, 2) wellhead protection programs for public water supplies, 3) geohydrologic review of siting proposals for new or expanded sanitary landfills and deep injection disposal wells. These programs allow tailoring of protection efforts and costs to the relative environmental hazard. Since no direct profit can be realized in the private sector for such research, Federal and State governmental funding will be necessary to expand these programs. In order to preserve and expand programs, the environmental benefits must be clearly communicated to an increasingly concerned public. Alternate funding sources should be explored, perhaps including bond issue authorization for geologic hazard research like the coal research bond issue passed in 1985 in Ohio. Future research activities will provide career opportunities directly in government service and indirectly in consultant contracts.

10:00 **USE OF THE GEONICS EM-31 AND EM-34 TO DEFINE A CONTAMINATION PLUME CAUSED BY UNAUTHORIZED ANNULAR DISPOSAL OF BRINE Janine Wilke, Ohio Department of Natural Resources, Division of Oil and Gas, 4435 Fountain Square, Columbus, Ohio 43224**

Earth electromagnetic conductivity is a surface geophysical method which is becoming more widely known for its quick and accurate delineation of contamination plumes. Use of two types of electromagnetic earth conductivity instruments enabled the ODNR, Division of Oil and Gas (Division) to determine the intensity and areal extent of contamination caused by unauthorized annular disposal of brine. The Geonics EM 34-3 earth conductivity meter was used to trace a contaminant plume which had affected three water wells in Salt Lick Townsh ip of Perry County, Ohio. The Geonics EM-31 defined subsurface contamination in the vicinity of the oil well and the tank battery.

Evidence which supports these findings includes isochlor and isoconductance maps which illustrate a contaminant plume centered at the oil well. Additional information, such as local stratigraphic and water well records, Division records and inspections, and water quality analyses used in conjunction with electromagnetic conductivity, enabled the Division to enact orders for the replacement of the two long-term affected water supplies.

10:15 **AN EVALUATION OF ANNULAR DISPOSAL WELLS IN OHIO, Thomas E. Tomastik & Mark E. Wolfe, Ohio Department of Natural Resources, Division of Oil and Gas, 4435 Fountain Square, Columbus, Ohio 43224**

Annular disposal is a brine disposal method in which produced brine from oil and gas wells is emplaced into the annular space under hydrostatic conditions between the surface and production casings of oil and gas wells. The Ohio Division of Oil and Gas has recently completed a systematic study of this disposal method and its effect on underground sources of drinking water. The surface casing condition and clay sealant quality of 100 oil and gas wells were evaluated when these wells were plugged and abandoned. Ninety-seven wells did not have sufficient clay sealant behind the surface casing to prevent migration of fluids behind the casing. Twenty-nine of these wells showed evidence of casing integrity failure. Hydrogeologic investigations were conducted on the wells which exhibited evidence of mechanical integrity failure. Damage case histories were prepared for three documented incidents of groundwater contamination in which the Division determined that annular disposal was the probable cause of the contamination.

Study findings support the amended rules enacted in June of 1989 which strengthen construction and testing requirements for annular disposal wells.

10:30 DRASTIC AND PESTICIDE DRASTIC: ANGLE, M. P., O.D.N.R., Division of Water, 1939 Fountain Sq. Drive, Columbus, Ohio 43224.

The Division of Water, Ground Water Resources Section has been utilizing the DRASTIC system for Ground Water Pollution Potential Mapping throughout Ohio. DRASTIC is an acronym for the seven parameters used in the evaluation of pollution potential: depth to water, net recharge, aquifer media, soil, topography, impact of the vadose zone, and hydraulic conductivity of the aquifer.

During 1990, both general DRASTIC and pesticide DRASTIC were utilized for mapping in four counties in conjunction with a Non-Point Source Pilot Project. Ross, Knox, Portage, and Sandusky Counties were selected as representing a broad range of geologic, geographic, and soil conditions.

Pesticide DRASTIC puts a much heavier emphasis on soils and topography (slope) than does general DRASTIC. Attenuation within the upper few feet of the surface is considered as being critical for pesticides. Values for Pesticide DRASTIC range from slightly to much higher than for general DRASTIC; the typical increase is about 25 to 35 points. Change between the two maps indicates the varying influence of the geology, topography, and soil types within each county.

10:45 ADAPTATION OF MICROBIAL METHODS FOR ENVIRONMENTAL STUDIES OF A CARBONATE AQUIFER. SMITH, Stuart A., CGWP, Consulting groundwater scientist, P.O. Box 88, Ada, Ohio 45810

In a series of long- and short-term investigations, sampling and analytical methods have been adapted for the investigation of microbial populations and biofouling in carbonate-aquifer wells. Methods have been screened and modified for use in relatively routine groundwater quality studies and the diagnosis of iron- and sulfur-related biofouling, taking an "appropriate methods" approach. The purpose has been to develop methods and tools that would allow for practical field studies of the microbial component in the aquifer for a more complete understanding of the aquifer environment.

Experience in these studies has shown that sampling has to be adapted for the purpose of the study. Pumped sampling requires lengthy purging to gather bacteria typical of the aquifer microflora. Analysis of wellbore biofouling benefits from sampling using immersed collection surfaces such as glass slides or other coupons. Exposure of slides to well water usually requires some days or weeks, and the time has to be determined by experimentation.

Methods for sampling are at present suitable for diagnostic purposes and probably provide reasonably representative samples. The relevence of cultural and identification methods currently available is still open to question. Interpretation should be in the context of other data.

C. Geology
First Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 082
Michael Angle, Presiding

2:00 SUCCESSFUL SHALLOW GEOPHYSICAL METHODS FOR DELINEATING BURIED RIVER VALLEYS
Harry C. Bircher and Dr. Benjamin H. Richard Department of Geological Sciences, Wright State University, Dayton, Ohio 45435

Over the past several years a number of Master's theses completed in the Department of Geological Sciences at Wright State University have been concerned with employing various shallow geophysical methods to delineate buried valleys in southwestern Ohio. The methods used in these studies included gravity, magnetics, ground penetrating radar, DC resistivity, shallow seismic reflection and seismic refraction. Examination of these studies has shown that gravity, shallow seismic reflection, and seismic refraction have proven to be the most successful methods for delineating buried valleys. Ground penetrating radar does not have the depth of penetration required to reach bedrock. Magnetics is unsuccessful due to cultural interference. DC resistivity has limited success because overlapping resistivity ranges make interpretation difficult. Gravity has a good success rate because the density contrast between the bedrock and valley fill-material is large enough making the valley easily detected. Both seismic methods have proven to be successful because the difference in velocity between the valley fill-material and the bedrock is large enough to give a good seismic responce.

2:15 STATISTICAL MODELING OF EROSION AT THE BLUFF TOE ALONG THE SOUTH SHORE OF LAKE ERIE.
Theodore M. Shaw, Department of Mathematics, The University of Akron-Wayne College, Orrville OH 44667, and Charles H. Carter, Department of Geology, The University of Akron, Akron OH 44325.

Maximum water level (ML), storm duration (DUR), wave set-up (WS), beach width (BW), and the amount of erosion (Y) were recorded at two week intervals and after storms during 1976-1980 at five sites from Sandusky Bay to Vermilion. Analysis of variance shows the importance of ML to erosion (significant results are: Helen Drive site, F=11.27, p=0.001, n=42; Pecks Cottage site, F=17.41, p=0.001, n=45; Showse Park site, F=5.80, p=0.0048, n=67). DUR and WS are more site dependent (Pecks Cottage DUR, F=3.68, p=0.019, n=44; Showse Park DUR, F=9.57, p=0.002, n=69; Pecks Cottage WS, F=4.24, p=0.021, n=45; Showse Park WS, F=6.78, p=0.002, n=69). Linear regression models were constructed to predict future amounts of erosion. The five models are: Helen Drive, Y = -0.689 + 0.241(ML), MSE= 0.0795, RSQ=0.425, n=43; Pecks Cottage, Y = -0.90 + 0.221(ML), MSE=0.040, RSQ=0.606, n=45; Oberlin Beach, Y = -1.226 + 0.202(ML), MSE=0.0018, RSQ=0.875, n=15; Sandusky Bay, Y = 0.2237(ML) + 0.059(DUR) - 0.779(WS), MSE=0.077, RSQ=0.621, n=32; and Showse Park, Y = -0.2248 + 0.043(ML) + 0.090(WS), MSE=0.0122, RSQ=0.285, n=69. These results show higher RSQ values than those obtained in a similar study in Chesapeake Bay.

2:30 USING XRD DATA AND A FEEDFORWARD NEURAL NETWORK TO STUDY THE DISTRIBUTION OF CLAY MINERALS IN SE OHIO. Eric Law. Dept. of Geology; Ralph Hollingsworth. Dept of Math and Computer Science, Muskingum College. New Concord, OH 43762

58 sandstone, siltstone and shale samples were taken along I-70 between Newark and Bridgeport, and along I-77 between Newcomerstown and Marietta. <2μ size fractions of all samples were separated. XRD data were obtain on oriented air dried slides of each clay samples.

Kaolinite and illite are the two major clay species found in all samples. Chlorite and illite/smectite mixed layers are minor and are only significant in some special samples.

In order to examine the relation between the distribution of clay species, rock types, rock color and rock strata, a 25-10-13 unit feedforward neural network is train by all XRD and petrographic data. The training is successful except a few samples with unusal XRD data.

2:45 BIOAUGMENTED FILTER PROCESS FOR SUGAR AND MILK WASTEWATER TREATMENT. Howard H. Lo and Akiko Nakayama, Department of Geological Sciences, and Yung-Tse Hung, Department of Civil Engineering, Cleveland State University, Cleveland, Ohio 44115.

In this laboratory study, two types of packing media, coarse sand and crushed coal, were evaluated for treatment of sugar and milk wastewater with bioaugmented filter process. The experiment was conducted to investigate the effectiveness of total organic carbon (TOC) removal and turbidity reduction for different strengths of sugar and milk wastewater. Liquid live micro organisms (LLMO) were used as the active bacteria and were added to columns filled with packing media for treatment of wastewater over certain period of time. The filters were operated in a fill-and-draw mode. The turbidity of milk wastewater in general decreased rapidly from one to five days treatment time, then remained nearly unchanged afterward. The crush coal appeared to be more effective in reducing milk wastewater turbidity than the coarse sand. Results of TOC measurement showed that the crush coal as packing media removed more TOC from wastewater than the coarse sand by more than 10 %. The addition of LLMO improved the TOC removal efficiency for both sugar and milk wastewater. It is also found that the removal of TOC by bioaugmented filter process for milk wastewater was more effective than for sugar wastewater, and the efficiency of TOC removal was better for the high strength than the low strength of wastewater.

3:15 THE HYDROGEOLOGY AND HYDROCHEMISTRY OF THE YELLOW SPRINGS, MIAMI TOWNSHIP, GREENE COUNTY, OHIO Michael Evers, Songlin Cheng, Robert Ritzi, Jr., Kenneth Kramer, Dept. of Geological Sciences, Wright State Univ., Dayton, OH 45435

The Yellow Spring, located in the Glen Helen Nature Preserve (Sec.14, R.8, T.4), is characterized by very little seasonal variation in temperature, chemical quality or discharge. The distinct yellow-orange staining at the spring face is caused by oxidation of ferrous iron, which forms a ferric iron hydroxide precipitate. The spring is oversaturated with respect to calcite, which precipitates upon contact with the atmosphere forming a large tufa mound at the spring's base. Discharge from the spring is relatively pristine, showing little impact from human activity. Comparison of Yellow Spring water with surface and ground water in the area shows less nitrate and chloride ion in the Yellow Spring than in other local waters. Data from wells in the area were used to construct a water table map, which indicates that the Yellow Spring receives recharge from outside the immediate Glen Helen area. Recharge to the spring appears to occur in an area which is agriculturally active and also contains numerous septic tanks. Discharge-recharge relationships suggest that the water issuing from the Yellow Spring could be old (from tens to hundreds of years). Tritium, a radioactive isotope of hydrogen, was used to date the spring water. The stable isotopes of oxygen and hydrogen were also studied to delineate seasonal recharge to the spring. At the time of this writing, isotopic data is currently being analyzed.

3:30 CHARACTERIZATION OF THE GROUND WATER SYSTEM IN THE BEAVER CREEK WETLANDS AREA, GREENE COUNTY, OHIO Thomas L. Haynos and Songlin Cheng, Dept. of Geological Sci., Wright State Univ., Dayton, OH 45435

The Beaver Creek Wetlands are an approximately 1000-acre minerotropic wetlands located in Greene County, Ohio. The Wetlands occupy a narrow corridor of land at the base of the valley along Beaver Creek and extend continually for approximately five miles to the Little Miami River. Believed to be approximately 10,000 to 12,000 years old, the Wetlands are fed primarily by ground water, and become the main source of water feeding Beaver Creek. The underlying aquifer system also is the primary source of drinking water for the area. An extensive residential well water level survey was performed and a preliminary ground water flow map was constructed from the hydraulic head data. The indicated flow directions were used to select appropriate residential wells for sampling and chemical analysis. Four piezometer nests were installed within the Wetlands, consisting of two piezometers each at depths of approximately two and ten feet into the underlying aquifer material. Hydraulic heads measured from the piezometers suggest primarily lateral ground water flow, at least to these depths. Preliminary chemical data reveal a distinction in chemical composition from the waters along the eastern, western, and northern flow paths of the valley. These results will be used to determine the relative contribution of discharge to the wetlands from the various recharge areas.

3:45 HYDROGEOCHEMICAL STUDIES OF SOIL WATER AT SYCAMORE FARM, MONTGOMERY COUNTY, OHIO Weilin Huang, Songlin Cheng, Ronald Schmidt, Department of Geological Sciences, Wright State University 45435

Sycamore Farm, located 10 miles west of Dayton in Madison Township in Montgomery County, is an experimental agricultural watershed for the study of the impact of farm chemicals on ground water quality. The goal of this study is to characterize the hydrogeochemical process in the vadose zone. Lysimeters were installed at depths of 1.5, 3.0, 5.0 ft in a soybean field. A negative pressure of -10 to -15 psi was applied to each lysimeter to collect soil water. The water was sampled approximately 48 hours later. The temperature, pH, and conductivity were measured in the field. Preliminary results show that significant changes in soil water chemistry occur in the upper 3 feet; alkalinity increases from 160 to more than 500 mg/L; conductivity increases from 400 to about 1000 uS/cm; measured pH decreases from 9.1 to about 7.5. We believe that measured pH values could change considerable from original soil water as a result of CO_2 outgassing during sampling process. P_{CO2} at different depths will be measured so that a correction can be made to the measured pH values. Analyses for major ion chemistry, mineralogy, and physical parameters of soil are in progress and will be used to characterize the water-air-soil interaction in this complex system.

4:00 GROUNDWATER FLOW AND CHEMISTRY AT A FUTURE QUARRY SITE IN SOUTHWESTERN OHIO. Robert L. Werner, R.G. Schmidt, Songlin Cheng, Robert W. Ritzi: Dept. of Geological Sci. Wright State Univ., Dayton, OH 45435

Ground water has been collected from 14 wells and 5 springs within the study area. Chemical analyses are for major ions. Six wells monitor ground water within glacial overburden, and 5 wells monitor the underlying Brassfield Limestone. The remaining 3 wells monitor ground water within the Elkhorn Shale. An investigation into the flow and chemistry of a limestone spring was initiated in June, 1990. To date, spring discharge has been observed to vary between 7 and 80 gpm, with little change in water chemistry with time. The variation in flow is believed to be attributable to recharge through vertical fractures in the bedrock, which transmit water into the basal, porous section of the limestone. The lack of variation in spring water chemistry may be due to the travel time from the recharge area to the spring. Water table and spring data collected to date indicate that the flow of ground water within the limestone is occurring predominantly through small scale secondary openings and along bedding planes enlarged by solution. Some movement of water through larger scale fractures is evident from spring flow observations after a significant recharge event, but this type of flow is believed to play a relatively minor role in the overall movement of ground water through bedrock. Chemical analyses indicate that ground water within the overburden and limestone have essentially identical chemistries, although data has yet to be collected from the overburden within the recharge area. This data will be collected in 1991.

4:15 LITHOSTRATIGRAPHY OF QUATERNARY SEDIMENTS IN GREENE COUNTY, OHIO

Dominic, D.F., S.K. Poole, and A.G. Cole, Department of Geological Sciences, Wright State University, Dayton, OH 45435

Unconsolidated glacial and post-glacial deposits in southwestern Ohio are economically important because they are a source of construction material and groundwater supplies as well as the material through which pollutants travel. The areal distribution and vertical sequence of these deposits are also critical in understanding the local and regional history of glacial retreat. We have begun a detailed study of the stratigraphy of unconsolidated sediments in Greene County, Ohio, utilizing subsurface and surface information.

The bulk of subsurface information comes from lithologic logs made by water well drillers and filed with ODNR. Although these logs vary in their reliability, standardizing lithologies into 5 categories (lithofacies) and correlating to nearby wells allows us to determine which logs are most reliable. This large ($\approx$ 500 wells/township) data base is augmented with more-accurate test borings and surface information (outcrops, quarries). This data, representing the three-dimensional distribution of lithofacies, is stored in a computer data base which is accessed by graphing and mapping software and which allows continual updating.

Initial analysis of the data indicates that sand and gravel lithofacies are abundant and separated by more laterally continuous, impermeable clay plus sand or gravel (diamicton) lithofacies. In many areas, sand and gravel lithofacies are most extensive on the margins of bedrock valleys. Although extensive, the diamicton lithofacies cannot be easily correlated as tabular units of till and some occurrences can be better interpreted as glaciolacustrine in origin.

4:30 PROBABILISTIC BEHAVIOR OF HYDROLOGICAL VARIABLES IN OHIO: STOCHASTIC MODELING AS AN AID TO DECISION MAKING UNDER UNCERTAINTY

Ritzi, Robert W., Jr., Department of Geological Sciences, Wright State University, Dayton, OH, 45435

The various magnitudes that are important in hydrogeology (e.g. hydraulic head, rainfall, streamflow, permeability, formation thickness, pollution concentrations, etc.) are variable with respect to both time and space. This translates into uncertainty in our ability to describe hydrogeological systems, and in our ability to predict future behavior of the systems in response to existing or anticipated forcings. In fact, developing forecasting models is an important component of effectively managing the supply and the quality of ground-water resources. Stochastic modeling can aid in building better predictive models by defining dependant variables in terms of the statistical moments of a probability distribution function dependant upon the statistical moments of the independent variables. An example is given in the need to estimate pollution transport through heterogenous glaciofluvial materials in Montgomery County, Ohio as a part of managing a water production facility. A non-parametric assessment of the local uncertainty associated with the presence of till (a spatially discontinuous barrier to flow) was conducted by treating it as an indicator random variable, estimating its spatial covariance structure, and then evaluating the probability of till presence through indicator kriging. The resulting till probability map is used as a basis for assigning till distributions within the context of constructing hydrogeologically plausible numerical models for particle transport. In further stochastic analyses, a sequential indicator simulator is being used to generate models of the till distribution as a part of Monte Carlo simulation experiments to estimate the statistical moments associated with particle arrival times.

4:45 MULTIVARIATE ANALYSES OF THE HYDROGEOCHEMICAL EVOLUTION OF GROUND WATER IN A CARBONATE FLOW REGIME

Wright, Stephen L., and Robert W. **Ritzi**, Jr., Department of Geological Sciences, Wright State University, Dayton, OH, 45435

A regional hydrogeochemical survey of a carbonate flow regime was conducted in Green County, Ohio. In order to reduce the large resulting data set, which included 13 variables measured at 56 locations, both factor and correspondence analyses were employed. The results suggest that the variability of the hydrogeochemistry is related to one or more of three major factors: high/low chloride, high/low nitrate, or high/low sulfate. High chloride waters are due in some areas to road salting, and in other areas are due to mixing with waters from the underlying shale. Agricultural land use practices occur in the high nitrate areas. Thus, the first two end members show anthropogenic influences on the variability of the hydrogeochemistry in this area. We hypothesize that either the dissolution of gypsum or the oxidation of pyrite explains the third factor. The samples are considered collectively with respect to the three end members to reveal trends in the hydrogeochemical evolution of the waters in the region.

C. Geology
Second Afternoon at 2:00 pm
SATURDAY, APRIL 27, 1991
University Hall 086
John Szabo, Presiding

2:00 LATE-GLACIAL AND POSTGLACIAL EVOLUTION OF THE ERIE ISLANDS. Jane L. Forsyth, Geology Department, Bowling Green State University, Bowling Green, Ohio 43403.

The Erie Islands owe their rocky outlines mainly to preglacial erosion by the Erigan River, though

Pleistocene ice certainly accentuated their relief. In late-glacial times, Wisconsinan ice covered the future islands from about 25,000 to 14,000 years BP, followed by their complete submergence during most the area's complex glacial-lake history until about 12,500 years BP, when lowered lake level (Lake Grassmere, at 195m 640 ft) exposed their summits. Subsequent ice retreat diverted incoming drainage to the north, and also allowed Erie-basin waters to drain away abruptly to the east over the isostatically low Buffalo sill, creating rocky hills above the newly exposed lake bottom. Isostatic recovery of the Buffalo sill raised and expanded lake waters, which first reached the hills about 9,000 years BP, and eventually created the islands and shoals of today. Data on the vegetation on these early islands is scanty, but was probably mainly spruce, birch, and alder; replaced later by jack pine, poplars, and red and white cedars; and eventually by oaks, maples, hop hornbeam, ashes, and hackberry.

2:15 GEOLOGIC SIGNIFICANCE OF GIGANTIC ASH FALLS IN THE ORDOVICIAN OF NORTH AMERICA AND NORTHWESTERN EUROPE. Stig M. Bergström, Dept. of Geol. Sciences, The Ohio State University, Columbus, OH 43210; Dennis R. Kolata, Illinois State Geological Survey, Champaign, IL 61820; and Warren D. Huff, Dept. of Geology, University of Cincinnati, Cincinnati, OH 43221.

Many beds of volcanic ash (K-bentonites) are present in Middle and Upper Ordovician successions over more than 1.3 mill. sq. km of eastern North America from the Appalachians to the Upper Mississippi Valley. K-bentonites of similar age are known from an even larger area in northwestern Europe. Some of the beds reach a thickness of 1-2 m and can be traced many hundred km in both North America and Europe. One of the most prominent beds, the Millbrig, has the same isotopic age (ab. 455 m.y.) and biostratigraphic position (upper A. tvaerensis Zone) as the thickest and most persistent bed in Baltoscandia, and we suspect that they may represent the same eruption(s). Although the precise location of the source volcanoe(s) remains enigmatic, it was evidently in the Iapetus Ocean between the Laurentian and Baltic plates. Hence a large volume of ash also must have been deposited in the Iapetus Ocean. We speculate that the total volume of the Millbrig alone in North America, and the coeval bed in Europe, is likely to have exceeded 2000 cubic km. The truly enormous size of these ash falls is illustrated by the fact that the combined volume of the Krakatoa, St. Helens, Pompei, Tambora, and Mt. Katmai eruptions is estimated to be no more than about 65 cubic km.

2:30 LITHOSTRATIGRAPHY OF FIVE BEDROCK CORES OF SOME UPPER, MIDDLE, AND LOWER ORDOVICIAN AGE ROCKS IN CINCINNATI, OHIO. E. Mac Swinford, Ohio Department of Natural Resources, Division of Geological Survey, 4383 Fountain Sq. Dr., Columbus, Ohio 43224.

The ODNR, Division of Geological Survey in cooperation with the Metropolitan Sewer District of greater Cincinnati drilled five continuous cores in Cincinnati, Hamilton County, Ohio. The project was part of a feasibility study to investigate the construction of a mine/tunnel to be used for temporary storage of overflow wastewater. Information gathered from the cores provided subsurface data for the Survey's bedrock geologic mapping program in southwestern Ohio. The stratigraphic interval penetrated by the five cores, ranging in depth from 746 to 980 feet, includes the interval between the Kope Formation and the upper 80 feet of the Knox Dolomite. The drill holes were geophysically logged and the cores were described to identify the lithologies of the units. Strength tests and chemical analyses were performed on the rock to help plan for mine/tunnel placement and construction. The mine/tunnel, if built, would be constructed within the Black River Group between approximately 400 and 800 feet beneath the Mill Creek valley. Engineering and chemical analyses indicate that the Black River Group is suitable for tunneling, and the high-calcium limestone could be marketed to partially offset the cost of mine/tunnel construction.

2:45 TEXTURE OF GOLD NUGGETS FROM PENNSYLVANIA MOUNTAIN, PARK COUNTY, COLORADO, AND IMPLICATIONS FOR GOLD NUGGET GROWTH BY CHEMICAL ACCRETION

KENAH, Christopher, Geology and Geography Dept., Denison Univ., Granville, OH 43023

Several current articles attribute the gold-rich rims found on many placer gold grains to precipitation of gold from aqueous solutions. These gold-rich overgrowths suggest that at least some gold nugget growth occurs by precipitation of gold onto existing gold grains. I suspect that the importance of this process has been significantly underestimated in gold nugget and placer formation.

Gold nuggets have not traveled far at Pennsylvania Mountain as inferred from the close geometric relationship of the gold vein source and the derived placer gold deposits. Two nugget types are present. One type is characterized by intersitial gold between interlocking quartz grains, a texture expected in gold-bearing veins. The second nugget type exhibits delicate surface textures on irregularly shaped nuggets. Close examination (10-80x) of this type reveals that gold is smeared or spread out on prominent surfaces and exposed protuberances, producing the appearance of solid gold nuggets. Concave and/or broken surfaces, which have been protected from abrasion, reveal a three-dimensional network that encloses poorly sorted silt and sand. These delicate surface textures are interpreted to indicate that gold is cementing unconsolidated sediment. Studies to document distinct geochemical signatures of lode and placer gold have been initiated.

3:00 INVESTIGATION OF PORPHYRY, BASE, AND PRECIOUS METAL ANOMALIES OVER THE CROW SPRINGS IGNEOUS COMPLEX, NEVADA: A GIS APPROACH. MEMMI, John M., and PRIDE, Douglas E., Department of Geological Sciences, The Ohio State University, 104 W. 19th Avenue, Columbus, OH 43210; KRUMM, Christopher W., Roy F. Weston, Inc., 100 Corporate North, Bannockburn, IL 60015

Mineralization in the Crow Springs area was generated during emplacement of a 202 m.y. quartz monzonite igneous complex, which metasomatized siltstones and quartzites of the Permian Mina Formation. Quantitative data were collected for Cu, Mo, Pb, Zn, and Ag in soil samples from a 17x17 grid with a quarter mile spacing. The geology was recorded at each sample point, and these data and the element concentrations have been manipulated and displayed using the OSU MAP (Map Analysis Package) GIS.

Metal anomalies were isolated by subtracting threshold values for each element; and single element, total metal, Cu+Mo, Pb+Zn, Cu:Mo, and Pb:Zn were plotted to emphasize metal anomalies with respect to geology. The raw data were edge enhanced, directionally filtered, "sliced," and reclassified to highlight trends in element concentrations that might correlate with faulting in the region.

Anomalous Cu, Mo, Pb, and Zn are present over the quartz monzonite complex, and over the contact between the porphyry and the metasomatized Mina Formation. GIS products support the contention that a Cu-Mo-Pb-Zn rich complex that also spawned Pb-Ag-(Au) veining was emplaced in the Crow Springs area--rock samples contain Au and Ag.

3:30 **NUMERICAL SIMULATION OF PLANETOID CAPTURE BY AN EARTH-LIKE PLANET: EFFECTS OF THE MASS OF THE PLANETOID.** **Robert J. Malcuit, David M. Mehringer, and Ronald R. Winters, Denison University, Granville, OH 43023**

A three-body numerical integration code with an energy-dissipation subroutine is used to study the effects of close gravitational interactions between an earth-like planet and planetoids of various masses. From previous work we have identified a stable capture window which extends from 250 to 330 degrees of earth anomaly. Within this zone any encounter in which sufficient energy is dissipated for planetoid capture results in an orbital orientation which is stable relative to solar perturbations. The planet anomaly (starting point of the earth-like planet) for this set of calculations is 320 degrees and the planetoid masses are 0.5, 1.0, and 2.0 lunar masses, respectively. The energy sink for gravitational capture is dissipation by tidal deformation of the planet and planetoid. Our theoretical planetoids all have the same denisty (3.34 g/cm^3) and deformational characteristics. When the distance of closest approach is at 1.43 earth radii, the displacement Love numbers (an index of the necessary deformability of the planetoid where h=0 means no deformation) for capture are 0.40, 0.25, and 0.16 for planetoid masses of 0.5, 1.0, and 2.0, respectively. The conclusion is that given similar deformational properties of the planetoids, the larger planetoids have a higher probability for gravitational capture.

3:45 HEAVY MINERAL ASSEMBLAGES IN PREWISCONSINAN (ILLINOIAN?) TILLS OF NORTHERN OHIO. John P. Szabo, Geology Department, University of Akron, Akron, OH 44325-4101.

The Grenville and Southern-Superior provinces of Canada influenced the composition of heavy mineral assemblages in the 0.125-0.250 mm fraction of preWisconsinan (Illinoian?) tills in northern Ohio. Heavy minerals were separated from samples of tills from sections at Swine Creek (Grand River lobe), Cedar Hill Circle (Cuyahoga lobe), Millbrook

type section (Killbuck lobe), Mt. Gilead fairgrounds (eastern Scioto lobe), and Hardin County landfill (western Scioto lobe).

Amounts of garnet and amphibole decrease westward whereas amounts of heavy minerals consisting of epidote, pyroxene, rutile, and opaques increase westward. Garnet-epidote ratios decrease from east to west. Epidote has significant positive correlation coefficients with rutile and opaques, and rutile has a significant negative correlation with amphibole. There are more significant differences between the Swine Creek section and the Hardin County landfill section than between the intermediate sections. This may suggest mixing of components from two source areas. A trilinear diagram of garnet, epidote, and opaques shows the greatest separation of data among sections. Regression of epidote on garnet suggest that mixing of components from the Grenville and Southern-Superior provinces occurred in northern Ohio.

4:00 SOME REASONS WHY MALLS AND OTHER DEVELOPMENTS ARE PLACED OVER ABANDONED DEEP MINES. Ann G. Harris, Department of Geology, Youngstown State University, 410 Wick Ave., Youngstown, OH 44555

Various facilities may be built over abandoned deep mines for many reasons. Some of these reasons are: an out-of-town developer not familiar with the area selecting a site and hiring an out-of-town engineering firm to do the investigative work; any developer developing a site in which development has taken place all around a site; testing procedures that include drilling only to refusal for the purpose of determining bearing capacity, etc., of the soil; researching land titles back only 40 years; not consulting the Abandoned Deep Mine Maps published by the State of Ohio; not talking to some of the local residents about the history of the site in question; not checking out the origin of some of the geographic names, e.g. Coal Hill, and not checking on the geology and stratigraphy of the site. Frequently, the discovery occurs after the facility has been completed. Somtimes the discovery is made when subsidence takes place. The discovery may be made during construction which may halt the project until test drilling and modifications are designed.

4:15 THE MULTI DISCIPLINE ANALYSIS AND PROJECTION OF AFFECTS FOR A DEVELOPMENT SITE SOUTH OF KENT, OHIO James R. Bauder, 6106 Armistice Avenue N.W. Canton, Ohio 44718

The studies of a development site south of Kent, Ohio verifies the importance of a multi disciplinary approach to the assessment of an environmental problem.

The use of various disciplines enabled the: recognition of subtle indicators, a quick check of geologic conditions, setup of an analysis program, and a single summary containing divergent disciplines.

Geologic data was expanded by the use of pedology, water well borings, glacial geology, geotechnical borings, hydrology, hydrogeology and soil physics. The insites afforded by the divergent disciplines enabled a combined summary of findings that presented a clearer understanding of the conditions.

A detailed study lasting more than 18 months determined and verified that the construction of a shopping mall would not directly affect the Kent Bog.

C. Geology
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

Board H @ 10:00 BEDROCK TOPOGRAPHY MAPPING OF SOUTHWEST OHIO: PROCEDURES, RESULTS AND A FEW SPECULATIONS ON THE TEAYS PROBLEM. J. Michael Clinch, Dept. of Geology, University of Dayton, 300 College Park Ave., Dayton, OH 45469-2364

The bedrock topography of eight counties in southwest Ohio has been mapped using computer database and contouring techniques. This method is rapid, and allows for continued upgrades of the mapping as more data are obtained. Additional areas should be mapped by the time of this presentation. While mapping of new areas and aquisition of new data may change these results, analysis of the bedrock topography maps produced by this method suggest that:

1) The ancestral Miami River and its tributaries drained south, towards Cincinnati, and may have left the state along the Whitewater River system. This system was pirated by the ancestral Ohio at Madison, Indiana, and the valleys were then deeply incised.
2) The "buried Teays" in western Ohio flows across the Cincinnati Arch, an unlikely location for a preglacial river, and it has no major tributaries. It may have formed as an ice-frontal drainage, when a series of north and northwest flowing rivers were dammed and diverted by the glaciers. The preglacial Teays may have flowed north or northeast into the Lake Erie Basin.
3) The Little Miami River was formed by the lateral diversion of three tributaries to the Miami River.

D. Medical Sciences
First Morning at 9:00 am
SATURDAY, APRIL 27, 1991
Townshend Hall 247
Lee Meserve, Presiding

9:00 AIDS AND SEXUAL BEHAVIOR IN A COLLEGE FRESHMAN POPULATION. Judy L. Adams, Department of Medical Technology, Bowling Green State University, Bowling Green, OH 43403

Exposure to the rapidly spreading Human Immunodeficiency Virus (HIV) is no longer confined to "high risk" groups. The incidence of the HIV antibody in a college population of a Midwestern "conservative" community has not been reported. Behavior and attitudes of college students impact on the probability of an increase in sexually transmitted HIV in the heterosexual community. Knowledge of HIV transmission, sexual attitudes, and behavior of entering freshmen in a Midwestern university with about 17,000 students was examined using a questionnaire to establish demographic characteristics, social and sexual attitudes and activities, and knowledge of sexually transmitted diseases, i.e., AIDS. The questionnaire was randomly distributed to 1,450 students; of the 941 completed questionnaires, 97.8% were freshmen. Less than 1/3 reported never having had intercourse; of the sexually active, nearly 82% had had intercourse by age 18. Most were aware of HIV and its transmission, although very few reported using recommended means to avoid exposure to the virus. Data suggest that current educational programs regarding sex and HIV/AIDS are not impacting on these young people. These results reveal a need for educational programs at earlier age levels or a major change in the current methods.

9:15 EFFECTS OF VARIOUS PCB DOSES ON THYROID STATUS AND CHOLINE ACETYLTRANSFERASE ACTIVITY IN 15-DAY OLD RATS. M. Sharma, L.A. Meserve and L.M. Juárez de Ku. Dept. Biol. Sci., BGSU, Bowling Green, OH 43403-0212.

Polychlorinated biphenyl (PCB) is a common pollutant, the ingestion of which is harmful to a number of physiological systems in adult animals. Previous studies in our lab have demonstrated that incorporation of PCB at 250 ppm into the diet of pregnant and lactating rats causes their 15 day old pups to suffer concomitant depression of thyroid status (hypothyroidism) and activity of the neurotransmitter biosynthetic enzyme choline acetyltransferase (ChAT) in two important brain areas (hippocampus and basal forebrain). Since 250 ppm is a high maternal dosage of PCB, it is of interest to evaluate the effects of lower doses (125ppm, 62.5ppm) on rat pup thyroid status and ChAT activity. Female rats were fed PCB (Arochlor 1254) in standard diet throughtout pregnancy and lactation. Fifteen day old pups were decapitated and activity of ChAT in hippocampus and basal forebrain was estimated by the ability of an homogenate to incorporate 14C-labelled acetyl-CoA into acetylcholine. All PCB doses significantly depressed thyroxine levels but had no influence on Triiodothyronine. When ChAT activity of various PCB levels was expressed as nm labelled

product generated/mg soluble protein/hr, a linear dose response curve was obtained; however, activity at doses lower than 250ppm were not significantly different from control. Thus it appears that 250ppm PCB is required to alter ChAT activity.

9:30 EFFECTS OF POLYCHLORINATED BIPHENYL (PCB) ON NEONATAL GROWTH-REGULATORY HORMONES: DIRECT OR INDIRECT? L.M. Juárez de Ku and L.A. Meserve. Dept. of Biol. Sci. BGSU. Bowling Green, OH 43403-0212.

Ingestion of polychlorinated biphenyl (PCB) by different animal species including humans induces hypothyroidism, and in developing offspring, retarded growth. Hypothyroidism induced by chemical, surgical, or congenital means is known to disrupt the hormones that control growth, but the effects of PCB on growth-regulating hormones have not been studied. It is also unknown whether PCB acts directly on growth-regulating endocrine organs or whether the retarded neonatal growth occurs because of the accompanying hypothyroidism.

Results indicate PCB indeed retards growth and also appears to influence some growth-regulating hormones in 15 day old rats whose mothers were fed 250 ppm PCB during pregnancy and lactation. Injection of PCB-fed rats with thyroxine (T_4) or triiodothyronine (T_3) appeared to normalize the growth and some of the hormones, with the triiodothyronine injections being more effective. PCB-fed rats had severely depressed thyroxine levels, slightly depressed triiodothyronine levels, depressed circulating growth hormone and somatomedin-C levels, and elevated hypothalamic somatostatin content. PCB-fed rats injected with triiodothyronine had depressed thyroxine levels, slightly depressed triiodothyronine levels, and normal growth hormone, somatomedin-C, and somatostatin levels; those injected with thyroxine had normal thyroxine levels, slightly depressed triiodothyronine levels, normal somatostatin content, and depressed somatomedin-C levels.

9:45 INFLUENCE OF DIETARY THYROID REPLACEMENT IN YOUNG GENETICALLY HYPOTHYROID(hyt/hyt) MICE. D.M. Colon and L.A. Meserve. Dept. Biol. Sci., BGSU, Bowling Green, OH 43403-0212.

The development of a genetically hypothyroid mouse model (hyt/hyt) has allowed the investigation of congenital hypothyroidism in experimental animals without the confound of chemical alteration of thyroid status. To study development in this animal model, the mutant parents must be supplied with dietary thyroid supplements to allow reproductive competence. There have been no previous studies of such dietary supplementation on growth and thyroid status of offspring of these animals. The present study determined body weight and selected organ weights, as well as circulating thyroid hormone levels, in 20, 25, or 30 day old pups of mice supplemented with dietary thyroid powder (0.025% w/w) during pregnancy and lactation. In most cases, but not always, mother mice were of the genotype +/hyt, and fathers were hyt/hyt. Results of this study revealed that genetically hypothyroid young could be differentiated from normal pups by depressed thyroid hormone levels at 20 and 25 days, but not at 30. Body and organ weights did not differ at any age, indicating early catch-up growth resulting from thyroid supplementation. Since young mice are weaned by the mother between 17-24 days of age, it appears that thyroid hormone levels are determined by genotype before weaning, but that increase in body weight and organ weight are influenced earlier in life by maternal thyroid supplementation. Investigators using this model should be cautioned that maternal thyroid supplementation may augment pup growth in genotypically hypothyroid young.

10:00 TUFTSIN ENDOCARBOXYPEPTIDASE: A SPLENIC-SPECIFIC ENZYME? K.D. Stakleff*#, D.W. Moorman#, D.L. Ely*, J.H. Holda* and D.J. Smith*. Dept. of Biology, University of Akron*, Akron, OH 44325 and Akron General Medical Center#, 400 Wabash, Akron, OH 44307.

Tuftsin is an immuno-potentiating tetrapeptide (Thr-Lys-Pro-Arg) incorporated in IgG_1 and is released sequentially by the activity of two enzymes, tuftsin endocarboxypeptidase (TECP) and leukokinase. TECP is presumed unique to the spleen because splenectomy results in immune deficiency; therefore, release of tuftsin should be inhibited when the spleen is removed. Omental autotransplant is a surgical procedure that maintains splenic activity instead of performing total splenectomy. Hepatic autotransplant is an alternate procedure that provides a vascular environment for splenic regeneration. To test the procedure, serum tuftsin was used as a marker for splenic activity in splenectomy, hepatic autotransplant and normal rats. The three groups indicated no statistical difference in tuftsin levels. Since tuftsin was present in splenectomized animals, TECP must also be present. IgG_1 radialimmunodiffusion (RID) and tuftsin assays were performed on monoclonal IgG_1 and serum to confirm the role of TECP. RID's showed the presence of IgG_1 in both sources. Tuftsin was not present in monoclonal IgG_1, but was in the serum. Results implicate TECP as the initiating enzyme for the release of tuftsin, but its presence after splenectomy was not explained. The data suggest TECP cleavage of IgG_1 was necessary for tuftsin detection and the spleen may not be the only source of TECP.

10:15 MODULATORY EFFECTS OF VASOPRESSIN ON THE RELEASE OF BETA-ENDORPHIN DURING MOTOR ACTIVITY. Tatjana Ruhe, Cyrilla H. Wideman, and Helen M. Murphy. John Carroll University, Cleveland, Ohio 44118.

Brattleboro rats (DI) which are vasopressin-deficient animals and Long-Evans rats (LE) which are vasopressin-containing animals were utilized to determine whether or not vasopressin has a modulating effect on beta-endorphin functioning during the activity-stress paradigm. All rats were housed in activity-wheel cages. Under ad-lib conditions, both DI and LE rats ran similar amounts. However, during food restriction, the DI and LE rats showed a burst of increased running activity which was significantly attenuated in LE rats. This indicates that in LE rats, vasopressin may provide a modulating effect that enables the LE animals to cope more effectively with stress. In order to determine whether the possible modulating effect of vasopressin influenced beta-endorphin levels, naltrexone, an opoid antagonist, was administered to the rats. Naltrexone greatly reduced running activity in both DI and LE rats, having a greater effect on the LE animals. It appears that vasopressin had a modulatory effect on the beta-endorphin levels in the LE animals which enabled them to regulate the amount of endorphins released during the stress reaction. This modulatory mechanism was absent in DI animals.

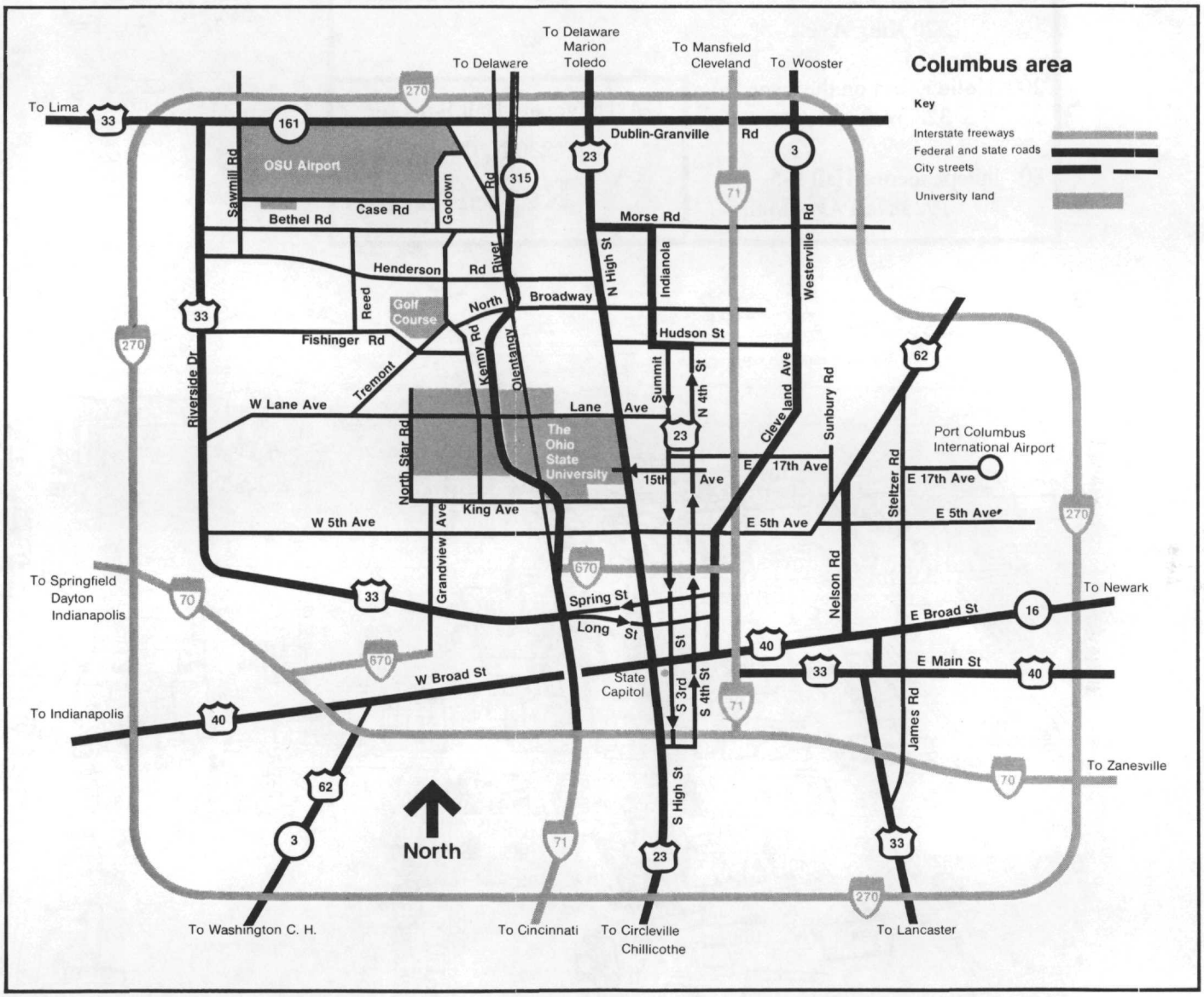
10:30 THE PAVLOVIAN CONDITIONING OF IL-1-INDUCED GLUCOCORTICOID SECRETION. Robert J. Nowinski, Helen M. Murphy, and Cyrilla H. Wideman. John Carroll University, Cleveland, Ohio 44118.

Recombinant interleukin-1B, which is capable of stimulating the pituitary-adrenal axis to secrete corticosterone, was paired with a saccharin drinking solution and lithium chloride injection in a taste aversion conditioning paradigm. Mice were injected with 0.5 ug rIL-1B 30 min. after consuming a novel saccharin solution. Plasma corticosterone levels were measured before conditioning to determine unconditioned steroid levels and 3 and 6 days after training when conditioned and nonconditioned animals were provided with the saccharin solution or plain water, or were left deprived. The pairing of saccharin, LiCl, and interleukin-1 was effective in inducing a passive avoidance response. There were no differences between the steroid levels of conditioned and nonconditioned animals supplied with plain water or those that remained deprived, which ranged from 140-170 nmol/L. Nonconditioned mice presented with saccharin had steroid levels that did not differ from control values. Conditioned animals presented with saccharin 3 days after training showed an elevation in steroid level, 1000-1200 nmol/L, which was significantly greater than that observed in any other group; 6 days after training, the corticosterone levels of conditioned animals were slightly lower, 800-1000 nmol/L. These results indicate that the interleukin-1 activation of adrenal cortical secretion can be conditioned to external stimuli.

D. Medical Sciences
Second Morning at 9:00 am
SATURDAY, APRIL 27, 1991
Townshend Hall 248
Stan Rittgers, Presiding

9:00 EVALUATION OF A HEMOGLOBIN (HGB) DEVICE IN PATIENTS WITH HIGH WHITE BLOOD COUNTS (WBC). DUCA, Dale J. and HAWKE, Carole, Cleveland Clinic, Lab Hematology, L-30, 9500 Euclid Ave. Cleveland, OH 44195

In patients with certain types of leukemia high WBCs may falsely elevate the Hgb concentration through turbidity. Correction is time consuming and prone to error. A new Hgb device, Hemocue (TM), which measures absorbance at two wavelengths was tested. Specimens from 96 patients with WBCs from 49 to 610 k/ul were tested using a Hemocue and a Coulter S+IV; also 38 of the 96 were tested with a Technicon H*1. Measurements on the S+IV were subjected to a correction procedure and were judged corrected if the result deviated > 0.3 g from the original which occured in 50 samples (52%). Hemocue results did not match even the corrected S+IV results on 14 specimens. Of the samples that did not match, 7 of the S+IV Hgb values in fact increased when corrected. If these are discarded, the Hemocue did not match the corrected S+IV results only 7.8% of the time. Hemocue appears to be convenient and reliable for Hgb measurement in the Cancer Center setting where high WBCs may cause interference.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Key
Interstate freeways
Federal and state roads
City streets
University land
To Delaware
To Delaware Marion Toledo
To Mansfield Cleveland
To Wooster
To Lima
To Springfield Dayton Indianapolis
To Indianapolis
To Newark
To Zanesville
To Washington C. H.
To Cincinnati
To Circleville Chillicothe
To Lancaster
North
OSU Airport
The Ohio State University
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State Capitol
Port Columbus International Airport
Dublin-Granville Rd
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Henderson Rd
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Hudson St
Fishinger Rd
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Lane Ave
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Bethel Rd
Case Rd
Sawmill Rd
Godown Rd
Reed
North High St
Indianola
Westerville Rd
Riverside Dr
Tremont
Kenny Rd
Olentangy River
Summit
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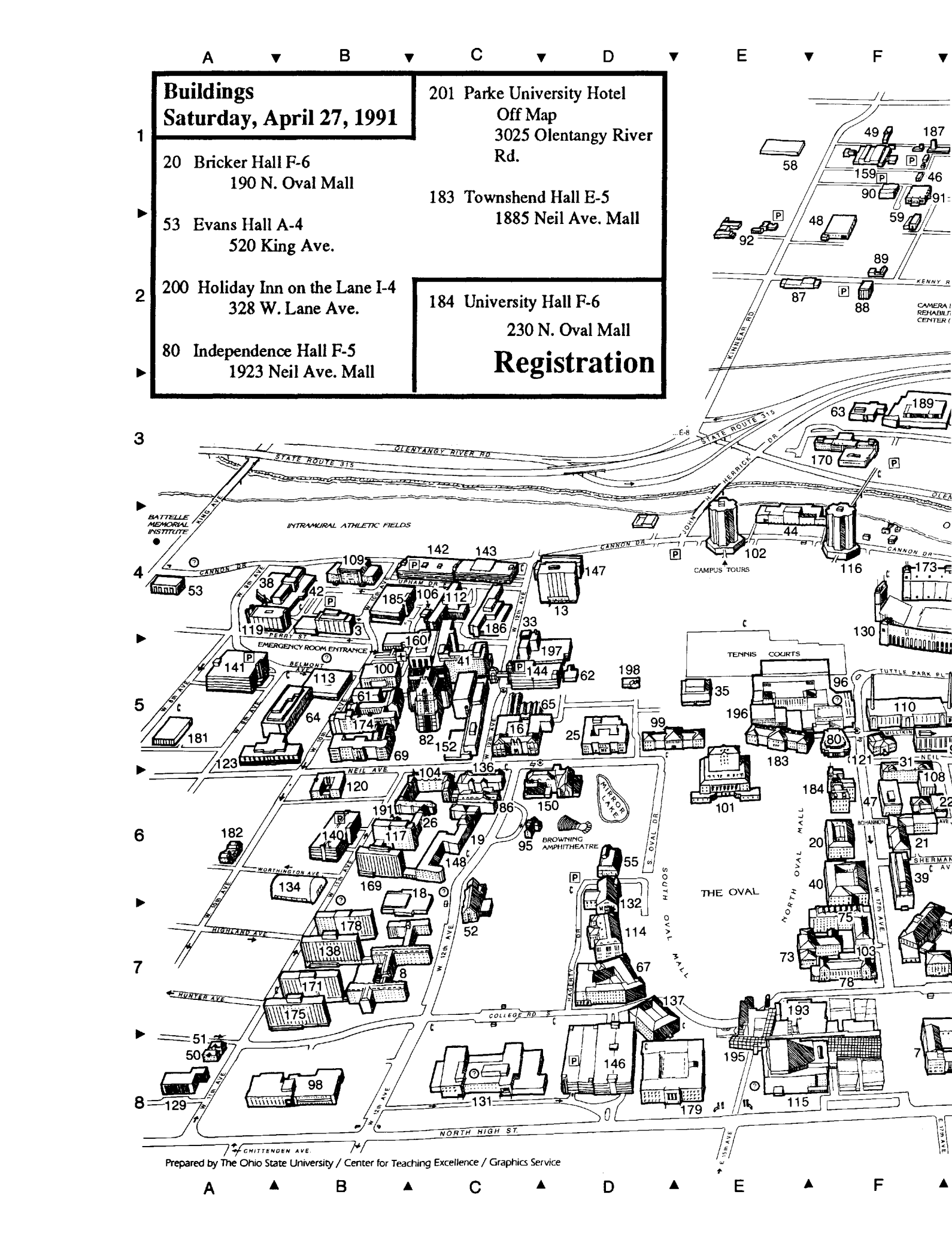
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Buildings
Saturday, April 27, 1991
20 Bricker Hall F-6
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201 Parke University Hotel
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3025 Olentangy River Rd.
183 Townshend Hall E-5
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Registration
OLENTANGY RIVER RD
STATE ROUTE 315
KINNEAR RD
KENNY R
CAMERA REHABILI CENTER
JOHN H. HERRICK DR
BATTELLE MEMORIAL INSTITUTE
KING AVE
INTRAMURAL ATHLETIC FIELDS
CANNON DR
CAMPUS TOURS
UPHAM DR
PERRY ST
EMERGENCY ROOM ENTRANCE
BELMONT AVE
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NEIL AVE
MILLIKIN
BOHANNON
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BROWNING AMPHITHEATRE
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NORTH OVAL MALL
WORTHINGTON AVE
HIGHLAND AVE
HUNTER AVE
COLLEGE RD S
NORTH HIGH ST.
CHITTENDEN AVE.
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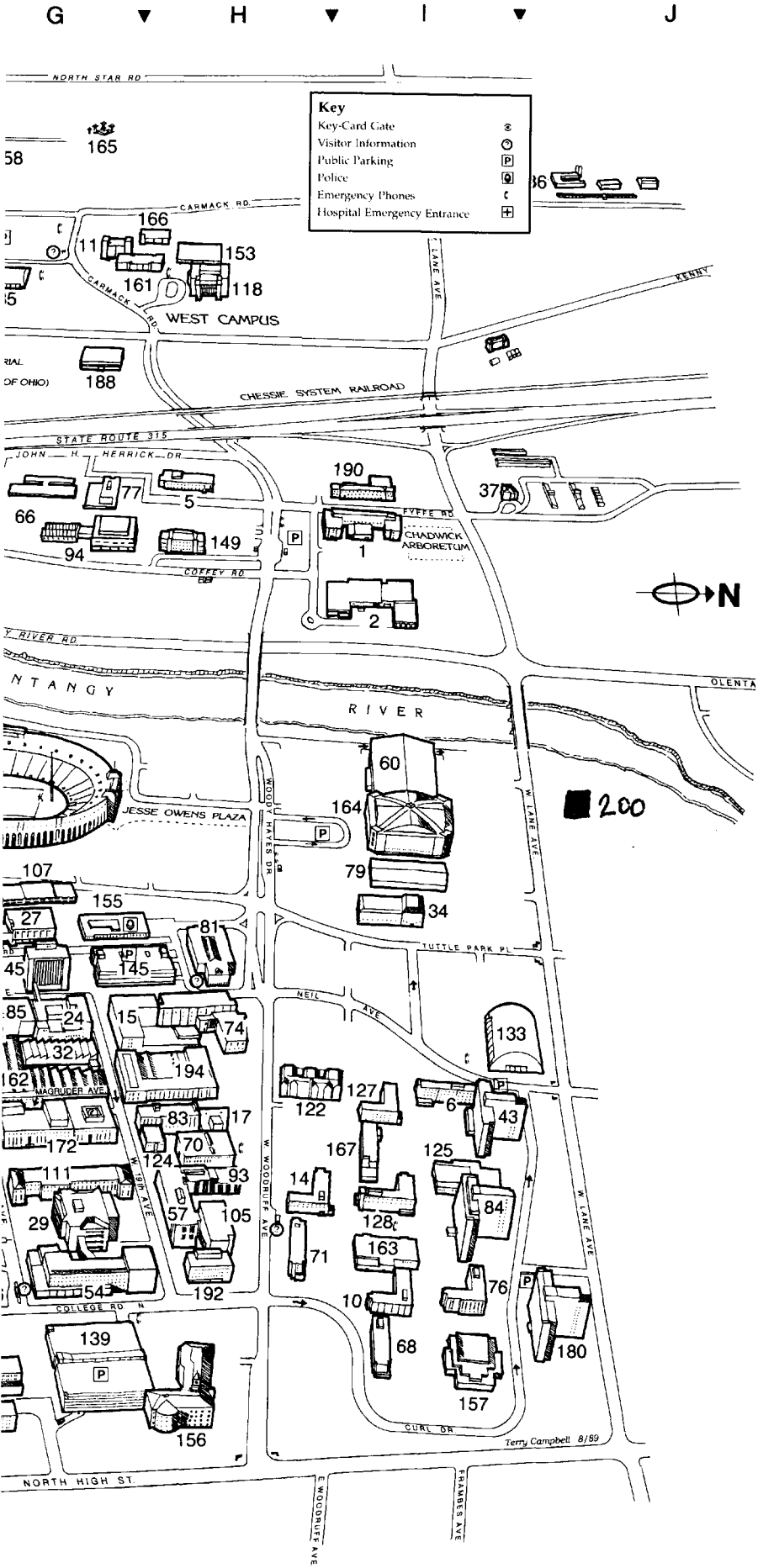

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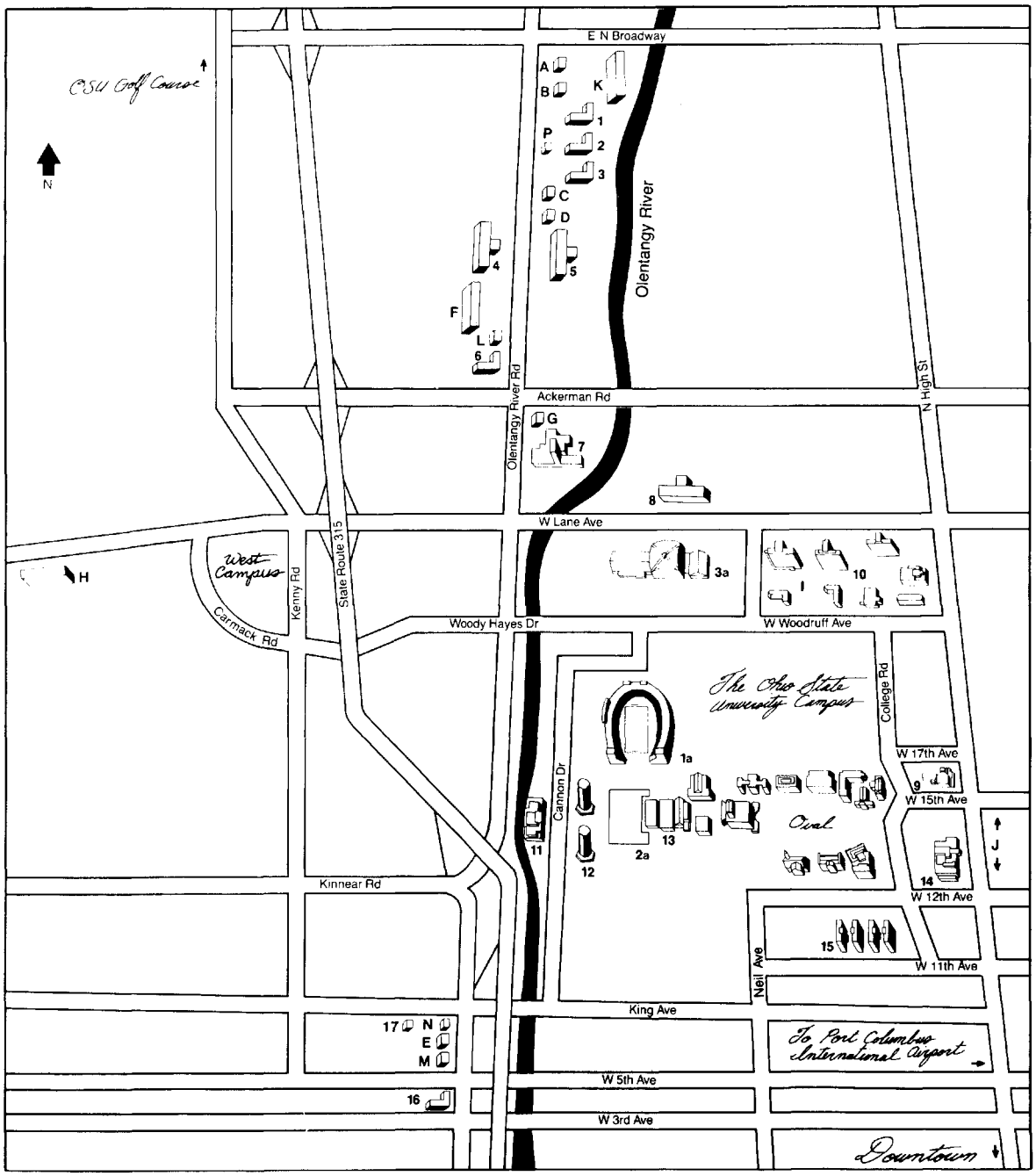

Hotels and Meeting Complexes . . . . . .

1 Cross Country Inn
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4 Parke University Hotel
5 Ramada University Hotel
6 Red Roof Inn
7 Fawcett Center For Tomorrow
8 Holiday Inn on The Lane
9 Mershon
10 North Residence Halls
11 Drake Union
12 Lincoln Tower
13 Larkins Hall
14 Ohio Union
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16 Olentangy Inn
17 Cross Country Inn

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G Tiffany's
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I North Dining
J Campus Shopping & Dining
K Hills Dept. Store
L McDonalds
M Jai Lai
N Wendy's
P Burger King

Other Facilities . . . . . .

1a OSU Stadium
2a Tennis Courts
3a St. John Arena/Ice Rink

9:15 MODEL GEOMETRY FOR HIV-1 and -2.
H. Westcott Vayo, Department of Mathematics, The University of Toledo, Toledo, Ohio 43606.

A model geometry for the HIV-1 and -2 viruses is proposed based on EM observations. Standard geometric shapes are employed to describe the surface membrane, stalk (glycoprotein 41), and knob (glycoprotein 120) of the virus. Based on approximate dimensions for certain features of the virus, estimates are provided for viral surface area and volume in both budding and mature stages, stalk-knob assembly surface area and volume, surface membrane area, surface membrane radius, and the ratio for surface area in the budding and mature virus. Such estimates may be useful in the quest for compounds that inhibit virus replication.

Evidence, based on the geometric model, shows that the budding virus has 2.3 to 2.7 times more surface area than the mature virus.

9:30 **HEMODYNAMICS WITHIN MODELED ARTERIAL BYPASS GRAFTS**

SE RITTGERS, Ph.D., RS KEYNTON, M.S., GH BHAMBHANI, B.S. and MCS SHU, Ph.D., Department of Biomedical Engineering, The University of Akron, Akron, OH 44325

Over one million vascular bypass grafts have been implanted to revascularize diseased arteries but 40% of these fail within five years. Some investigators attribute graft failures to endothelial and smooth muscle cell proliferation while others believe that hemodynamics also play a key role. In vitro models with junction angles of 30°, 45° and 60° were used to simulate lower extremity bypass graft anastomoses. Results using laser Doppler anemometry and ultrasound Doppler Color Flow Mapping have documented anastomotic flow patterns under steady and pulsatile conditions, respectively. In all cases, there is a distinct low flow, separation zone near the inner wall of the artery just beyond the toe of the anastomosis, a very likely site for the initiation of intimal hyperplasia. When an artery with total occlusion is bypassed, fluid upstream of the anastomosis is stagnant and responds to the graft inlet flow by circulating in a large vortex pattern, thus becoming an ideal site for thrombus formation.

9:45 MAGNETIC RESONANCE, ULTRASOUND, AND HISTOPATHOLOGIC CORRELATION OF ACUTE EQUINE TENDON INJURIES. Jeffrey R. Crass, MD, Ronald Genovese, VMD, James A. Render, DVM PhD, and Errol M. Bellon, MD. MetroHealth Medical Center, Department of Radiology, 3395 Scranton Road, Cleveland, Ohio 44109.

The histologic basis for the abnormalities observed by MRI and US in the injured tendon are not well defined in either the horse or human. This study was undertaken to asses the role of the athletic horse as a model for human injury and to correlate the imaging and histopathology.

Five horses with acute tendon injuries were studied one to seven weeks after injury. US was performed just prior to euthanasia. MRI was performed immediately post mortem. The tendons were preserved en bloc and histologic preparations made. Correlations were made between histology and imaging at multiple stages in the healing process.

The lesions were readily seen by US and MRI which correlated well. Lesions characterized by edema and/or cellular infiltration were of decreased echogenicity compared with normal tendon, and of increased signal on MRI. With healing US echogenicity and MRI signal returned to normal. The injured athletic horse is a useful experimental model for the study of tendon injury imaging.

10:00 LIPOPROTEIN BINDING AFFINITY OF TIN-ETIOPURPIN, A SENSITIZER FOR PHOTODYNAMIC THERAPY.
M. Mastroianni and G.M. Garbo
Dept. Chemistry, University of Toledo, Toledo, OH 43606

Photodynamic therapy (PDT) is an evolving modality for cancer treatment which combines the use of a systematically administered sensitizer and the application of light. Tin-etiopurpurin(SnET2) is a second generation sensitizer which has been shown to be very effective following photoactivation for treatment of transplantable bladder tumor in rats. It has been reported that lipoproteins(especially LDL) seem to be the in vivo physiological carriers to the tumor for some of the sensitizer proposed for PDT. In this study the binding properties of SnET2 to the separated lipoprotein classes were examined. Lipoproteins were separated from dog plasma by gradient ultracentrifugation on the basis of density determination. Sensitizer (in 4% dimethyl sulfoxide in phosphate buffer saline) was incubated with increasing amounts of each lipoprotein fraction and the fluorescence intensity of SnET2 measured. The progressive increase in fluorescence intensity was due to lipoproteins binding and monomerizing action. In addition, the emission peak showed a noticeable red shift indicating a change in the dye microenvironment. LDL showed a higher affinity for SnET2 since saturation was reached at higher concentration of this lipoprotein class; using published methods, it was calculated that each molecule of LDL binds 65 molecules of SnET2 while each HDL molecules binds 8 molecules of sensitizer. These results are in agreement with those reported for other sensitizers and therefore appears to confirm the importance of the LDL lipoproteins class as carrier in vivo for photodynamic therapy (supported by NIH Grant PO1-CA48733).

10:15 THE INFLUENCE OF WOUND HEALING ON URINARY NITRATE LEVELS IN RATS. Michael J. Dunphy*, Laurie N. Strang+, Michael A. Marletta# and Daniel J. Smith+ *Department of Natural Sciences, Walsh College, N. Canton, Ohio 44720, +Department of Chemistry, The University of Akron, Akron, Ohio 44325, #Department of Biological Chemistry, The University of Michigan, Ann Arbor, Michigan, 48109.

Activated macrophages are involved in the biochemistry of wound healing and nitric oxide (NO) production. Thus, macrophage-derived NO may be important in wound repair. In this study, urinary nitrate levels and wound closure profiles were obtained on wounded-non-infected and wounded rats infected with *S. aureus* or *P. aeruginosa*. Rats were fed custom low-nitrate diets, allowed to reach basal low urinary nitrate output, given full-thickness circular dermal wounds and 24 h urine samples were collected throughout the wound healing period. Wound closure was assessed by computerized video imaging and urinary nitrate, an oxidation product of metabolic NO, was measured by gas chromatography. Urinary nitrate output for non-infected wounded rats increased significantly (88%, $p < 0.001$) within 24-48 h post wounding and slowly returned to basal levels by 27-32 days post-wounding. A less intense but significant ($p < 0.05$ to 0.01) effect was observed with the infected-wounded rats, but the return to basal nitrate level was apparently sensitive to the infection. In addition, all groups exhibited rapid and intense increases in nitrate output when the external wound was nearly closed. The result suggest that urinary nitrate output may reflect the extent of wound repair, and that the precursor to nitrate (possibly NO) may be important throughout the wound healing period.

D. Medical Sciences
First Afternoon & Business Mtg at 1:30 pm
SATURDAY, APRIL 27, 1991
Townshend Hall 247
Daniel Ely, Presiding

2:00 SOCIAL STRESS INCREASES SALT APPETITE WHICH IS PARTIALLY REGULATED BY THE SYMPATHETIC NERVOUS SYSTEM. Nabil Bourjelli, George Gould, Monte Turner & Dan Ely. Dept. of Biology, The University of Akron, Akron, OH 44325.

The objectives of the following study were to determine: 1) if hypertensive rats had a higher sodium appetite than normal blood pressure (BP) rats; 2) if intruder stress increased salt appetite more in hypertensive rats than normal BP rats; 3) if the genes for salt appetite were inherited on the Y chromosome or autosomes; and 4) if the sympathetic nervous system (SNS) was involved in salt appetite regulation. Four groups (n=6-8/group) of male rats were studied for five months: normal blood pressure Wistar Kyoto (WKY) rats, spontaneously hypertensive rats (SHR), the F_6 generation cross between an SHR mother and WKY father and the reciprocal F_6 cross between a WKY mother and SHR father. Rats were given a four water bottle choice ad libitum (0%, 0.5%, 1.0% and 1.5% NaCl) and provided with normal Purina rat chow (0.3% Na). SHRs had higher salt appetite after exposure to intruder stress than WKYs and the F_6 generation derived from a hypertensive mother (SHR) had higher salt appetite than the F_6 generation derived from a hypertensive father. Administration of a centrally acting SNS blocker-clonidine, reduced salt appetite after stress from 19 - 97%, which was dependent upon the genetic background of the rat strain. The data suggest that the SNS was involved in salt appetite regulation, but not the Y-chromosome.

2:15 BLOOD PRESSURE DURING ROUTINE ACTIVITY, FEEDING, AND HANDLING STRESS IN BLACK RACER SNAKES (COLUBER CONSTRICTOR). Jerry Stinner and Daniel Ely, Dept. of Biology, The University of Akron, Akron, OH 44325

The purpose of the following study was to determine fluctuations in systemic arterial blood pressure (BP) - brought on by routine daily behaviors and acute stress situations. Black racers chronically fitted with dorsal aorta catheters were housed at 30°C on a 12L:D cycle inside large cages in which they were free to move about. BP in resting snakes was 20-30 mmHg, but there were large differences between nocturnal and diurnal recordings due to greater activity during the day, with BP occasionally reaching values in the 80-95 mmHg range. Feeding had a remarkable effect upon BP. Within 10-20 sec after grabbing a live mouse, BP rose from resting levels to near 100 mmHg. The high BP was maintained until the mouse had been killed and swallowed. Acute stress brought on by tapping a snake resulted in coiling, striking, crawling and thrashing. BP increased by only about 10-20 mmHg above resting values, even though heart rate was similar to levels observed during feeding. Plasma norepinephrine and epinephrine increased by an impressive 51X and 26X, and plasma glucose increased 58%. There was also significant hemoconcentration that, at least partially, explained observed increases in plasma osmolarity, sodium, potassium, calcium and protein levels. This study suggests that BP in reptiles is quite variable, depending upon the behavioral state and, despite only a 3-chambered heart, high BP routinely occurs.

2:30 A NEW ANIMAL MODEL TO STUDY THE INTERACTION OF TESTOSTERONE AND HIGH BLOOD PRESSURE. Disha Hadi, Daniel Ely, Ronald Salisbury, Monte Turner and Mark Johnson, Dept. of Biology, The University of Akron, Akron, OH 44325

The objective of this study was to determine if male rats with normal blood pressure and a deficient androgen receptor would develop high blood pressure when crossed with a high blood pressure parent. Female Holtzman rats (n=15) carrying the testicular feminization (TFM) gene were crossed with male spontaneously hypertensive rats (SHR) and blood pressure (BP) was measured weekly from 5-15 weeks in F_1 hybrid males. Approximately 50% of the F_1 hybrid males were TFM males and testosterone receptor deficient, and 50% were normal. BP of control Holtzman males, females and TFMs were also followed for the same time period. The F_1 normal male hybrids had an average systolic BP (12 weeks) of 190 ± 8 vs. 175 ± 8 mmHg of the TFM hybrid males (ANOVA, $p<.05$). Control Holtzman normal males and TFM males were 120 ± 5 mmHg and 110 ± 6 mmHg respectively. Female F_1 hybrids also showed a rise above female controls (155 ± 6 mmHg vs 110 ± 6 mmHg, $p<.01$) but not as high as either of the F_1 males. Plasma electrolytes, triglycerides and cholesterol were not significantly different between F_1 hybrid males. The results suggest that the presence of the testosterone receptor increases the BP in the hybrid males. Testosterone may interact with a gene product from the male Y-chromosome to increase the blood pressure.

2:45 AROMATASE ACTIVITY IN FOREBRAIN AREAS OF NEONATAL MALE, FEMALE, AND TESTICULAR FEMINIZED (Tfm) MALE SIBLINGS. Molly Anderson and Ronald Salisbury. Dept. of Biology, The University of Akron, Akron, OH 44325-3908

In the rat the sexual differentiation of forebrain areas requires the presence of estrogen and estrogen receptors during a critical period of development. In the male rat estrogen is formed from androgen within neuroblasts under the activity of an enzyme(s) referred to as aromatase. Studies in adult rats indicate that aromatase activity in some, but not all, brain areas is androgen receptor dependent. We have inferred that if this is also true in the developing brain, then this would imply a role for androgen receptors in the normal sexual differentiation process. Thus, the objective of this study was to determine the effect of androgen receptors on aromatase activity during the critical period of brain sexual differentiation. Aromatase activity was measured in forebrain areas of sibling male, female and Tfm rats on neonatal days 6, 8, and 10. A Tfm animal is a genotypic male that inherits a severe deficiency of androgen receptors and a female phenotype while its sibling brothers have a normal population of receptors and normal phenotype. The brain areas examined were the preoptic-anterior hypothalamus, septum, amygdala, cortex, and posterior hypothalamus. Our data indicate that in all animals studied, regardless of sex or age, aromatase activity was not androgen receptor dependent.

3:00 NEW BACKCROSS SUBSTRAINS CONFIRM HYPERTENSIVE EFFECT OF THE SHR Y CHROMOSOME. C. Dawes, M. Turner, D. Ely and M. Johnson, The University of Akron, Akron, OH 44325-3908

To identify the specific genes involved in the inheritance of high blood pressure (b.p.) it is necessary to separate the effect of an individual locus and its relationship to b.p. from the other loci. We have demonstrated that the Y chromosome significantly influences b.p. in crosses between SHR and the Wistar Kyoto strain (WKY). Autosomal loci were also involved in increasing b.p. Crosses were undertaken to isolate each of these genetic components. Through nine generations of crosses we have created two substrains. SHR/y which contains the SHR Y chromosome in a WKY autosomal background and SHR/a which contains a WKY Y chromosome in a SHR autosomal background. Both substrains maintain male b.p. over 185mm Hg. The genetic makeup of each strain has been confirmed using known SHR and WKY RFLP markers and DNA fingerprints. These two substrains will be essential in identifying the genetic loci responsible for SHR hypertension, as each factor can be studied without the complicating effects of other loci increasing pressure.

3:15 STEROID SULFATASE IS A CANDIDATE GENE FOR THE DEVELOPMENT OF HYPERTENSION IN THE SPONTANEOUSLY HYPERTENSIVE RAT. M. Johnson, D. Ely and M.Turner. The University of Akron, Akron, OH 44325.

Steroid sulfatase (STS) is an important enzyme involved in the conversion of several inactive steroid sulfates, including glucocorticoid sulfates, to their hormonally active desulfated analogs. We have measured the level of STS enzyme activity in the testis, adrenal, liver, kidney, hypothalmus and heart of the spontaneously hypertensive rat (SHR) and the normotensive Wistar-Kyoto (WKY) rat. At 9 weeks of age, the only significant difference in STS activity was a 0.75-fold lower level in the SHR adrenal gland. At 12 weeks of age the STS activity in adrenal and testis of the SHR were significantly elevated (5.6- and 2.6-fold) compared to the WKY rat. The Km for one substrate, estrone-sulfate, was determined and found to be the same in the 12 week SHR and WKY rat testis (31.3 and 34.6 uM) and adrenal (35.4 and 32.9 uM). This suggests that the increase in enzyme activity in the SHR is due to increased amounts of enzyme present in these tissues rather than a kinetically different STS form. Steroids and glucocorticoids are known to play an important role in the development of hypertension. The elevation in STS activity we observed occurs coincident with the rapid increase in blood pressure in the SHR at this age. Our results suggest an important role for the steroid sulfatase gene in the development of hypertension.

3:30 WKY IS A BETTER MODEL OF CATARACT DEVELOPMENT THAN SHR. J. Gould, D. Ely and M. Turner. The University of Akron, Akron, OH 44325-3908.

Previous results had reported a 100% incidence of nuclear cataract formation in the Spontaneously Hypertensive Rat (SHR). However, the parental Wistar Kyoto strain (WKY) was not assayed as to cataract development. In the present study cataract development was studied in WKY, SHR, and hybrid strains between SHR and WKY. Offspring of crosses between SHR and Holtzman rats were obtained and checked for cataract formation. Cataract development and severity in the SHR strain was age dependent. All strains were characterized at 5 months of age. There was no significant difference in cataract formation or severity between SHR and WKY or any of the hybrid strains derived from SHR and WKY. The Holtzman strain had no cataract formation, while all the offspring of the SHR X Holtzman cross had observable cataract formation. These results suggest the WKY strain is a better model of cataract formation than SHR, since it eliminates the possible confounding effects of hypertension. The genetic allele or alleles responsible for cataract formation in the WKY and SHR strains are dominant and incompletely penetrant in the SHR background.

3:45 ENHANCEMENT OF SHORT-TERM HEART PRESERVATION USING AN IRON CHELATOR; MIMOSINE. Dean Petrinec, Gail Dunphy and Dan Ely. Dept. of Biology, The University of Akron, Akron, OH 44325

During short-term, 1 hour in vitro ischemic heart preservation and reperfusion, irreversible tissue damage occurs caused by reactive oxygen intermediates, such as superoxide, singlet oxygen, hydrogen peroxide, hydroperoxyl, and hydroxyl radicals. Reduction of the related oxidative damage of reperfused ischemic tissue by

iron chelators are of primary importance in maintaining heart function. We assessed whether mimosine (30 mg/L), an iron chelator, added to a Krebs-Henseleit solution maintained heart function in the Langendorff isolated rat heart. A group (n=8) of male spontaneously hypertensive rats (SHR) had the hearts removed and perfused with Krebs-Henseleit and served as controls and another group (n=8) of male SHRs had mimosine added to the Krebs-Henseleit solution. The mimosine treated hearts had significantly better left ventricular function than the control hearts after 1 hour of global ischemia. Diastolic pressure was 6X lower, systolic pressure was 12% higher, and there was 25% better coronary flow. The data suggest that mimosine may be an effective perfusate additive to prevent iron mediated damage in both short and long-term heart preservation. Further studies will examine the dose-response effects and potential enhancement of 24 hour preservation.

4:00 THE EFFECTS OF ANESTHETICS ON BIOGENIC AMINE RELEASE DURING ELECTROCONVULSIVE THERAPY IN DEPRESSED SUBJECTS. Byron Petraitis, Bruce Massau, Rajnikant Kothari & Daniel Ely*. Aultman Hospital, Canton, OH 44710 and * Dept. of Biology, The University of Akron, Akron, OH 44325-3908.

In severe depression electroconvulsive therapy (ECT) has been used as a primary means of treatment for 40 years. The principal reason for ECT is the efficacy in relieving depression with equal or better results than other therapies (60-90% effective). The mode of action of ECT appears to be through the release of biogenic amines and hypothalamic peptides in the brain. Heart arrhythmias from autonomic nervous system imbalance do occur with ECT. Therefore, the objectives of the following study were to: 1) determine the peripheral levels of serotonin, norepinephrine, dopamine and epinephrine during and after exposure to ECT in depressed patients and 2) evaluate the effects of three anesthetics upon the ability to stabilize the autonomic nervous system to prevent heart irregularities. Six patients with clinical depression were studied. Three anesthetics were evaluated for their ability to stabilize the sympathetic nerves: methohexitol, thiopental, and propofol and atropine was used in all patients to reduce parasympathetic activity. In 5/6 patients the biogenic amines increased 4-6X within 3 minutes after ECT, the increase was less and the peak slightly delayed with propofol as compared to the other anesthetics. The data suggest that propofol may have advantages in protecting the cardiovascular system during the intense stimulation of ECT.

4:15 IMIPRAMINE IN PANIC DISORDER: DOSE/RESPONSE RELATIONSHIPS Matig R. Mavissakalian and James M. Perel, The Ohio State University, College of Medicine, Department of Psychiatry, 473 West 12th Avenue, Columbus, OH 43210-1228, U.S.A.

Fifty-five patients with panic disorder, with agoraphobia, without depression, completed a double-blind, randomized, placebo-controlled dose-response study of eight weeks' duration. Treatment consisted of four identical-looking tablets at bedtime and no instructions or encouragement for self-direct exposure to phobic situations. Treatment conditions included placebo (N = 14) and three weight-adjusted Imipramine dosages; i.e., 0.5 mg./kg./day (N = 14; $\bar{X}$ = 37.1 + 9.7 mg./day; $\bar{X}$ = 43.6 + 33.2 ng./ml.); 1.5 mg./kg./day (N = 15; $\bar{X}$ = 98.3 + 19.5 mg./day; $\bar{X}$ = 102 + 70.2 ng./ml. and 3.0 mg./kg./day (N = 12; $\bar{X}$ = 198.8 + 33.7 mg./day; $\bar{X}$ = 166.4 + 55.5 ng./ml. Compliance, as assessed by pill counts and plasma tricyclic levels/dose ratios, was high. The data provided strong support for a positive dose relationship for panic and phobic symptoms and revealed significant correlations between the bioavailability of the drug and improvement, in particular between panic and the plasma/Imipramine component. The results provide incontrovertible evidence for a specific pharmacological effect within this disorder and implicate the serotoninergic system in the mediation of Imipramine's antipanic and antiphobic effects.

D. Medical Sciences
Second Afternoon at 2:00 pm
SATURDAY, APRIL 27, 1991
Townshend Hall 248
Augusta Askari, Presiding

2:00 SULFATION OF NOREPINEPHRINE, 6-HYDROXY-DOPAMINE, AND SEROTONIN IN RAT LIVER. P.S. Hogan, C.A. Knapke, M.G. Melaragno, and S.S. Singer, Chemistry Department, University of Dayton, Dayton, Ohio 45469.

The potential for the sulfation of the hormone norepinephrine, the neurotransmittor serotonin, and the model Parkinson-producing compound 6-hydroxydopamine were examined in rat liver. First, radioisotopic assays were devised to allow the study of each sulfation reaction. These assays identified the optimum conditions for making measurements with each compound. Then the sulfation capacity of each compound was compared to dopamine, the chemical we have found to be the most effectively sulfated catecholamine hormone. While none of the test compounds were sulfated as well as dopamine, all served as substrates for the rat liver enzymes in males. Ion exchange chromatography on DEAE-Sephadex A-50 columns showed that sulfation of the three test compounds was catalyzed by the enzymes we have previously named dopamine sulfotransferases I and II. Examination of the sulfation of these compounds in male and female rats showed that females have a lower capacity to sulfate each of the test compounds than to sulfate dopamine. The data may provide important basic insights into the physiological and pharmacological actions of the test compounds.
** This research was supported by a grant from the University of Dayton Research Council.

2:15 EXCRETION OF LEAD (Pb) AND ZINC (Zn) FOLLOWING CHELATION THERAPY WITH 2,3-DIMERCAPTOPROPANE SULFONATE (DMPS) IN LEAD POISONED RATS. M.R. Lust, L.K. Staab and M. Kreimer-Birnbaum. Research Department, St. Vincent Medical Center, 2213 Cherry St., Toledo, OH 43608.

Excessive body burden with lead is still a significant health problem. Chelating agents are available for treatment of lead poisoning, but improved drugs are needed, especially those that may be given orally. One such drug is DMPS. Rats were given 200 µg/ml lead acetate in drinking water (LP group), while controls received water. Both groups received three five-day courses of DMPS (50 µmol/kg b.w./day) and urines were collected for analysis of metals. Urine Pb levels in control rats were essentially unchanged by DMPS treatment. The LP group, however, showed a peak following each of the three DMPS treatments. The peaks were of decreasing magnitude and at their maximum the concentrations of excreted lead were three to six fold higher than pre-treatment levels. Zn excretion was elevated after each DMPS treatment in both the controls and the LP group, with the highest levels observed after the third course. The metabolic effects of DMPS on metals such as Zn is of great importance, inasmuch as Zn is a component of the enzyme delta-aminolevulinic acid dehydratase (very sensitive to lead), and an essential element. These results indicate that repeated low doses of DMPS may be an effective therapy for lead poisoning. [Supported in part by a grant from the F. M. Douglass Foundation.]

2:30 PHARMACOKINETIC AND TISSUE DISTRIBUTION STUDIES OF BIS(DI-ISOBUTYL OCTADECYLSILOXY)SILICON 2,3-NAPHTHALOCYANINE (isoBOSiNc) IN NORMAL AND TUMOR-BEARING RATS. M.M. Zuk(1,2), B. Rihter(2), M.E. Kenney(3), M.A.J. Rodgers(2) & M. Kreimer-Birnbaum(1) (1)Research Dept., St. Vincent Med. Ctr., 2213 Cherry St., Toledo, OH 43608; (2)Ctr. for Photochemical Sciences, Bowling Green State Univ., Bowling Green, OH; (3)Dept. of Chemistry, Case Western Reserve Univ., Cleveland, OH

IsoBOSiNC is a representative of a group of naphthalocyanine derivatives with spectral and photophysical properties that make them attractive candidates for photodynamic therapy (PDT) of solid tumors. IsoBOSiNc was delivered to normal and tumor-bearing rats by intravenous injection as a suspension either in 10% Tween 80 in saline or 10% Cremophor EL + propylene glycol in saline. For each carrier system two doses were studied: 0.25 mg/kg and 0.50 mg/kg of body weight. IsoBOSiNc was isolated from several tissues, organs and tumors, as well as peritumoral muscles and skin. Independent of the delivery system and the dose, the dye was retained in tumors at higher concentrations than in normal tissues, except for spleen and liver. Levels of dye were very low or not detectable in rat brains. IsoBOSiNc retention in tumors was markedly influenced by the delivery system. Optimal times and ratios of drug in tumor vs. peritumoral tissues were determined and these conditions are being tested in PDT experiments. [Supported by grants from NIH CA-46281, the F. M. Douglass Foundation, and the Geiger Foundation for Cancer Research.]

2:45 ISOLATION AND QUANTIFICATION OF AN IMMUNE STIMULATOR: TUFTSIN. K.D. Stakleff*#, D.J. Smith*, D.L. Ely*, D.W. Moorman# and J. Holda*. Dept. of Biology, University of Akron*, Akron, OH 44325 and Akron General Medical Center#, 400 Wabash, Akron, OH 44307.

Tuftsin (Thr-Lys-Pro-Arg) is a tetrapeptide responsible for many stimulatory effects on the immune system. Lack of tuftsin can result in a patient being severely immunocompromised. An assay for serum and synthetic tuftsin is necessary to determine in vivo activity. Tuftsin is detectable and quantifiable using reverse-phase high-performance liquid chromatography (RP-HPLC). A previously described method employed RP-HPLC as a filtering device and crudely quantified tuftsin using mass spectometry (MS). MS was eliminated and RP-HPLC detection was optimized to simplify the procedure. Tuftsin is similar to another oligopeptide, angiotensin. The RP-HPLC isolation procedure for angiotensin was adapted to tuftsin (DeSilva, et al., Anal. Biochem., 174:80-7, 1988). The new method reduces interference by serum proteins. Retention time is confirmed with kentsin (Thr-Pro-Arg-Lys) and fragment 1-3 (Thr-Lys-Pro). Although recovery of tuftsin is 20%, sensitivity of the assay is 1-10 nmoles/ml, which exceeds requirements for normal serum tuftsin levels. Quantitation is possible using a solution and processed tuftsin standard curve. Simplification and optimization of the tuftsin procedure should promote use and research of tuftsin in clinical and pharmacologic applications for stimulation of compromised immune systems.

3:00 ERGOGENIC AIDS EMPLOYED BY COLLEGIATE ATHLETES. D.M. Spillman. Nutrition and Food Systems, 164 McGuffey Hall, Miami University, Oxford, Ohio. 45056

This three year study of collegiate athletes includes dancers, football, basketball and hockey players, weight lifters, and body builders. Dancers, weight lifters and body builders utilized large amounts of protein, often as much as 65% of the caloric daily intake. Body builders relied heavily on the use of leucine, isoleucine and valine for "bulking agents". At the time of body shows the body builders took large amounts of condensed sweets or alcohol to aggravate vein extension. During training periods, football players, weight lifters and body builders utilized Dianabol (methandrostenolone), Winstrall (stanzol) Anabol (methandroil), Creton and Android T (testosterone). All of these agents are "bulkers" and add muscle to the lean body mass. Caffeine was heavily used by the basketball players and the dancers. Tablets as well as popular drinks were consumed in large amounts prior to performance. The dancers also used soda ($NaHCO_3$) to speed recovery of soreness. These aids worked in varying degrees of success and harm. The use of soda results in diarrhea, while the caffeine can deplete the available glucose before the competition. The taking of "bulkers" results in altered ego, testosterone production and susceptibility to fatigue and infection.

3:15 PREVENTING ATHEROSCLEROSIS: THE BOWLING STUDY STUDY (1991 UPDATE). W.E. Feeman, Jr., M.D., 640 South Wintergarden Road, Bowling Green, Ohio, 43402

The Bowling Green Study is an ongoing prospective and retrospective study of the primary and secondary prevention of atherosclerosis. The study began in 1974 and as of 1 January 1991 involves 8,500 patients of all ages, from newborn to nonagenerians. The racial mix is approximately 90% caucasian, the chief minority being chicano. Follow-up time is 1-16 years.
The study evolved a graphic means of predicting who will develop atherosclerosis within the first eight decades of life. The graphic, which also guides therapy to reverse existant atherosclerosis, graphs the cholesterol retention fraction versus systolic blood pressure for cigarette-users, past cigarette-users, and never-cigarette users. The graphs for never-smokers and past-smokers demonstrates a clear-cut zone of minimum risk for atherosclerosis.

D. Medical Sciences
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

Board A @ 9:00 AN IN VITRO COMPARISON OF THE IMIDAZOLES ITRACONAZOLE AND FLUCONAZOLE AGAINST FILAMENTOUS FUNGI. Jere M. Boyer, Research Director, Aultman Hospital, 2600 Sixth St., S.W., Canton, OH 44710

A total of 28 filamentous fungi were tested for susceptibility to the imidazoles itraconazole (I) and Fluconazole (F). The testing method , reported previously by the author, used media impregnated disks plased on plates containing antibiotic and seeded with a spore suspension. Results are reported as the mean of MIC's for six runs. Six species of the genus Aspergillus were tested. Results for I were 1.3, 1.5, 1.3, 2, 1.4, and 0.5, reported as ug/ml. For F the results were 0.7, 0.4, 1.0, 1.1, 1.8, and 1.1. Three species of Alternaria were tested. For I the results were 0.15, 0.1, 0.4. For F the results were 0.05, 1.0, and 1.2. Three species of Drechslera were tested. Results for I were 3.0, 1.5, and 0.8. For F, results were 0.5, 0.8, and 0.1. Three Fusarium species were tested and for I the results were 1, 2, and 15. For F the results were 0.25, 0.5, and 1.5. For the three isolates of Mucor tested, the results for I were 1.2, 1.5, and 0.2. For F the results were 0.7, 1.2, and 0.5. Two species of Fonsecaea were tested resulting in I values of 0.9, and 0.9. For F the results were 0.3 and 0.5. Three isolates of Rhizopus were tested with I values of 1, 2.3, 1 while F was 0.5, 0.8, and 0.3. Two genera of Pseudallescheria were tested showing 5 and 2 for I and 2 and 1 for F. Threeisolates of Penicillium were tested showing 2.2, 4, and 50for I and 4.4, 2, 100 for F. Usually F was superior to I.

Board B @ 9:00 DEHP LEVELS IN MICROWAVE-WARMED CRYSTALLOID FLUID. Roger A. Moore*, Michael F. Zorko+, Teresa Presutti*, Jennifer DeVries+, Charles L. Rasmussen* and Michael J. Dunphy* *Department of Natural Sciences, Walsh College, 2020 Easton N.W., N. Canton, Ohio 44720 and +Department of Emergency Medicine, Aultman Medical Center, Canton, Ohio 44710.

Heated intravenous (IV) fluids are used to treat victims of hypothermia and severe trauma. The polyvinylchloride (PVC) fluid bags are commonly softened with the plasticizer diethylhexylphthalate (DEHP), a suspected human toxin. Microwave warming of frozen PVC bags has been employed in hospital emergency rooms prior to IV infusion. Some concern exist regarding DEHP leaching during microwave-mediated thawing. The concentration of DEHP in microwave-warmed crystalloid fluid was measured as a function of fluid temperature. IV saline bags were microwave warmed to temperatures ranging from 37 to 80 °C. The resultant DEHP level in the bag fluid was measured by gas chromatography. The mean (n = 15) DEHP levels in bags warmed to 37, 50 and 60 °C were 60.6, 61.9 and 68.3 nmol/L, respectively. The standard deviations ranged from 12.7 to 20.2 nmol/L. These results were not significantly different from levels in control (non-heated) bags (mean = 53.5 +/- 16.8 nmol/L, n = 15, $p > 0.05$). However, the mean DEHP levels at 70 °C, 74.7 +/-20.5 nmol/L, and 80 °C, 82.4 +/- 23.5 nmol/L, were significantly different from controls ($p < 0.01$). The results indicate that microwave warming of IV saline bags up to 60 °C does not significantly increase the amount of DEHP in the infusion fluid.

Board C @ 9:00 PHARMACOKINETICS OF QUADROL IN RATS. Michael Goshe*, Michael J. Dunphy* and Daniel J. Smith+ *Department of Natural Sciences, Walsh College, 2020 Easton N.W., N. Canton, Ohio 44720 and +Department of Chemistry, The University of Akron, Akron, Ohio 44325.

N,N,N',N'-Tetrakis(2-hydroxypropyl)ethylenediamine, (Quadrol), stimulates macrophages *in vitro* and promotes tissue collagen deposition in wounded mice. Quadrol, various chemical derivatives and its polymeric forms are currently being evaluated for applications in accelerated tissue repair. Thus, data regarding the *in vivo* disposition of Quadrol were needed. Male Sprague-Dawley rats were 50, 100 and 200 mg/kg of neutralized Quadrol solution via gastric lavage or intravenous (IV) injection into a jugular vein cannula. Blood samples were obtained at various times up to 8 h post-dose, and urine samples were collected in metabolic cages every few hours for 24 h. Quadrol was assayed by gas chromatography. Quadrol concentration vs. time plots were obtained for plasma and urine. In addition, *in vitro* binding of Quadrol to bovine and human albumin and rat erythrocytes was assessed. The results indicated that Quadrol's disposition fit a one-compartment phamacokinetic model of distribution. Quadrol was poorly absorbed from the GI tract, < 5% protein bound and didn't bind to rat erythrocytes. Following oral dosing, maximum plasma levels occurred between 40-60 min and the elimination half-life was 100-110 min. No extractable metabolites were detected in the urine by GC-MS. Quadrol's volume of distribution and renal clearance were consistent with its polar-hydrophilic structure.

Board D @ 9:00 **JUNBE: A TRADITIONAL CHINESE HERB PREPARATION USEFUL IN TREATING RHEUMATOID ARTHRITIS.**

A. Lu, A. Wang and M. Yamaguchi Inst. of Basic Theory, China Acad. of TCM; Dept. of Vet. Anat. and Cell. Biol, College of Vet. Med, OSU, Columbus, OH 43210

Junbe, a mixture of traditional Chinese herbs, was prepared by Zhu Liangchun, an expert in traditional Chinese medicine. Junbe has been used widely in China to treat rheumatoid arthritis (RA) and has been proven to be clinically effective. In order to explore the pharmacological mechanism of action of Junbe in the treatment of RA, 40 Wistar rats weighing 100 grams to 110 grams were divided into two groups: control group (CG) and Junbe group (JG). All rats were injected intradermally with 0.2mg/rat of a mixture of type II collagen and incomplete adjuvant around the tail to induce experimental arthritis. Fifteen days later, the rats in JG were given 2.0mg of Junbe solution once a day. One month later, the knee and ankle joints of all rats were examined morphologically and histochemically with a light microscope. The joints of rats in CG showed proliferation of synovial cells, infiltration of lymphocytes in synovial tissue, or fibrosis of synovial tissue, and defective articular cartilage. The joints of the rats in JG showed obvious alleviation of inflammation in synovial tissue, and repair of the cartilage defect by proliferation of chondrocytes. The results suggest that Junbe is one of the most effective drugs in the treatment of rheumatoid arthritis.[This work is partially supported by a World Health Organization fellowship and a grant from American Heart Association.]

Board E @ 9:00 LINGUAL SENSITIVITY IN SKILLED AND UNSKILLED SPEAKERS. Linda Petrosino, Department of Communication Disorders, Bowling Green State University, Bowling Green, OH 43403, Donald Fucci, Ohio University, Athens, OH 45701, Susanne Krummel, Special Tree, Inc., Romulus, MI.

A unique relationship exists between the auditory and tactile sensory feedback modalities during speech production. The purpose of this study was to investigate the effect of disrupted auditory feedback on lingual tactile threshold in skilled and unskilled speaking conditions. Lingual vibrotactile thresholds were collected for 22 subjects under the following experimental conditions: 1) production of a familiar speech task with normal auditory feedback; 2) production of a familiar speech task with disrupted auditory feedback; 3) production of an unfamiliar speech task with normal auditory feedback; 4) production of an unfamiliar speech task with disrupted auditory feedback. To assess the sensitivity of the tongue, thresholds were gathered using standard lingual vibrotactile threshold testing procedures. This procedure was done before and after each experimental procedure. Means and standard deviations were calculated for the four conditions. An analysis of variance for a two factor design was completed. Post hoc analysis of variance were performed to isolate the significant difference among the conditions. Analysis revealed a significant difference between the lingual vibrotactile threshold values in the skilled auditory disrupted condition and the other three conditions.

Board F @ 9:00 EFFECTS OF HEMODILUTION USING PLASMA(P) OR SALINE ON ECG VOLTAGES IN RATS J.A.Carpenter, PhD, R.L.Hamlin DVM,PhD, and G.Ekis, PhD. Columbus State Comm. Coll. and Ohio State Univ., Dept. Vet. Physiology, Pharmacol Sisson Hall, Cols., Ohio 43210

Rats anesthetized with ketamine/xylazine were bled in 4ml.increments up to 20 ml. One group had blood volume replaced by saline(S)(n=6) and the other by P (n=4).Hematocrit(Htc) and dorsoventral radiographs of heart size(HS)and ECG(leadsI,aVF,V3) were obtained at each exchange(X). In the S X rats as Htc (control=45(SD 3)) decreased to 17(SD 1), ECG voltages (V) decreased to 0.58(SD 0.11) mV (p=0.01)(control=0.89(SD 0.16)) and HS decreased 15% (SD 3).V of QRS was calculated as the square root of the sum of the squares of peak to peak V in all 3 leads.In contrast in the P X rats as Htc was achieved to the same levelas with S, HS did not change (p=0.05) and V increased to 1.0(SD 0.09) mV (p=0.05), a 24% increase.The decreased V when X lead to decreased Htc and HS was caused by thick ening of the left ventricular free-walland dipole shifts and decreased intensity.The increased V resulted not from change in HS but from decreased resistivity of intracavitary blood. We do not know why HS decreased when X occurred with S rather than P.

Board G @ 9:00 A CORRELATION OF B CELL POPULATION SIZE AND AGE. D.L. Hill and L.M. Young, Department of Biological Sciences, Ohio Northern University, Ada, OH 45810.

Comparisons among B cell populations were made between individuals of different age groups in an attempt to correlate the number of B cells with the general decline in immune competency commonly associated with aging. Five healthy human male volunteers were selected from each of the following age groups: 18-30, 31-40, 41-50, 51-65. Following isolation of the monocyte fraction from whole blood, B lymphocytes were identified by tagging with fluorescein-conjugated rabbit anti-mu antibodies. B cell population size was determined using a fluorescence microscope equipped with a UV filter. Preliminary data indicate fewer B cells/sample in the 51-65 age group. These data would tend to support the hypothesis that the decline in immune competency may be linked with a decrease in antibody-producing cells.

Board H @ 9:00 EFFECT OF COPPER-DEFICIENT DIET ON AMINO ACID LEVELS IN RAT AUDITORY STRUCTURES. W.B. Farms, D.A. Godfrey, and A. Askari, Depts. of Otolaryngology and Surgery, Med. Coll. of Ohio, Toledo, Ohio 43699.

Since copper deficient (CuD) diets impact central nervous system functions, 50 g weanling male Sprague-Dawley rats were fed a CuD diet, 0.6 mg Cu/kg, ad libitum for eight weeks. Control rats were fed a copper adequate (CuA) diet of 6.0 mg Cu/kg. Asp, Glu, Asn, Ser, Glu, His, Gly, Thr, Arg, Tau, Ala, Tyr, and GABA were assayed by high performance liquid chromotography (HPLC), using a reverse-phase column. The primary amine was reacted with beta-mercaptoethanol and o-phthaldialdehyde. The mobile phase involved Solvent A (10 mM sodium phosphate, 25 mM sodium acetate, 2% tetrahydrofuran, and 2% methanol adjusted to pH 6.35 with acetic acid) and Solvent B (methanol), with a gradient of 22% methanol increasing to 100% methanol. CuD rats exhibited 55% higher glutamine levels than CuA rats in inferior colliculus homogenates, and 56% higher glutamine levels in whole brain homogenates, while no significant difference was found for the cochlea and cochlear nucleus. Thus, copper may have a very specific role in amino acid metabolism in the brain.
[Supported by NIH grant DC00172]

Board I @ 9:00 STABILITY AND STRUCTURE OF THREE-WAY DNA JUNCTIONS CONTAINING UNPAIRED NUCLEOTIDES Neocles B. Leotis, Wendy Kwok*, Jen Newman
*Rm1 615 S. Johnson St, Ada, Oh 45810

Non-paired nucleotides stabilize the formation of three-way helical DNA junctions. Two or more unpaired nucleotides located in the junction region enable oligomers ten to fifteen nucleotides long to assemble, forming conformationally homgeneous junctions, as judged by native gel electrophoresis. The unpaired bases can be present on the same strand or on two different strands. Up to five extra bases on one strand have been tested and found to produce stable junction The formation of stable structures is favored by the presence of a divalent cation such as magnesium and by high ionic strength. The order-disorder transition of representative three-way junctions was monitored optically in the ultraviolet and analyzed to quantify thermodynamically the stabilization provided by unpaired bases in the junction region. Three-way junctions having reporter arms 40 base-pairs long were also prepared. Each of the three reporter arms contained a unique restriction site 15 base-pairs from the junction. Asymmetric complexes produced by selectively cleaving each arm were analyzed on native gels. Cleavage of the double helical arm opposite the strand having the two extra adenosines resulted in a complex that migrated more slowly than complexes produced by cleavage at either of the other two arms. It is likely that the strand containing the unpaired adenosines is kinked at an acute angle, forming a Y-shaped, rather than a T-shaped junction.

Board J @ 9:00 DIFFERENTIAL EFFECTS OF LOW DOSE CISPLATIN EXPOSURE ON MDCK AND LLC-PK1 KIDNEY CELL LINES. A. Chadwick, W. Reynolds and M. Johnson. The University of Akron. Akron OH 44325.

The toxicity of low doses of cisplatin on MDCK and LLC-PK1 kidney cell lines was studied in 7 days post confluence cultures. Cells were exposed to cisplatin for varying amounts of time and then pulsed with ^{3}H-

thymidine, ^{35}S-methionine or ^{3}H-uridine to assess the effects of the cisplatin dose on DNA, protein or RNA synthesis. 10 uM cisplatin for 24 hours significantly reduced thymidine uptake and incorporation into DNA into the LLC-PK1 cells. Thymidine incorporation into MDCK cells was also reduced, but uptake was unaffected by cisplatin treatment of these cells. Methionine and uridine uptake and incorporation were not affected by cisplatin in either cell line. We further examined the differential effects of cisplatin on thymidine uptake and incorporation in these cell lines using a group of dithiocarbamate derivatives. After exposure to cisplatin cellular uptake of thymidine was restored to control levels or higher by some of these compounds without apparent effect on incorporation. Other derivatives had positive effects only on the incorporation of thymidine into DNA. Our results suggest that in addition to effects on DNA synthesis, cisplatin has may selectively alter membrane transport functions.

Board K @ 9:00 CHARACTERIZATION OF NORMAL AND VARIANT HUMAN RED BLOOD CELL PYRUVATE KINASES. S. Janish, J. Fernandez, and M. Johnson. The University of Akron, Akron, OH 44325.

Three variant forms of human red blood cell pyruvate kinase (PK) have been characterized at the kinetic and gene levels and compared to normal human PK controls. Higher Km (PEP) was observed for the PK "Memphis" and PK "Pontotoc" variants and a lower Km (PEP) was detected for PK "Bartlett". PK "Bartlett" and PK "Pontotoc" had slightly higher Km (ADP) values. All three variants were extremely thermal labile and required increased concentrations of the allosteric activator, fructose-1,6-diphosphate, for 50% activation. To evaluate the possible genetic/molecular basis of the defective enzyme in these variants, a search for restriction fragment length polymorphisms was conducted. DNA isolated from the patients with the variant PK's was digested with twelve different restriction enzymes, electrophoresed on 0.8% agarose gels and transferred to nitrocellulose. These filters were hybridized with a 32-P labelled, rat PK cDNA clone, followed by autoradiography to detect PK gene sequences. The results of this analysis suggest that no major insertions, deletions or rearrangements have occurred in these variant genes. The underlying genetic defect appears to involve possible point mutations, resulting in changes in the primary amino acid sequence of the variant protein.

F. Geography
Only Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 014
Alvar Carlson, Presiding

9:00 HOUSING AND GENDER: A GEOGRAPHY OF HOUSING PROGRAMS IN ATHENS, OHIO. Ingvild Swensen. Department of Geography, Ohio University, Athens, Ohio 45701-2979.

The United States' federal policy directed toward the low-income households and regional development has changed dramatically the last fifteen years, from the Community Development Block Grants of the seventies to state programs and reliance on direct rent subsidies or housing allowances. The tendency is to spend less on this sector altogether: the Reagan administration cut the housing assistance budget by 37 percent from the fiscal year 1984 to the fiscal year 1985. How do these changes in policy influence the situation at a local level?

Athens, Ohio is one community that received substantial federal funding for its development projects in the late seventies. Several questions were raised after the projects were ended; the geographical and social distribution of the federal funds in Athens; the magnitude and nature of growth in local economy spurred by the funds received; and the gender differences in housing improvements and jobs obtained from the Athens Plan for Neighborhood Revitalization. I will in this paper concentrate on the last issue.

This paper is organized as follows: I first give a brief overview of the federal housing and community development policy the last twenty years; second, I discuss my findings on the gender differences, especially regarding housing quality and funds made available to female headed households; and third, I place the findings in a geographical and theoretical perspective.

9:15 INTERPRETATION OF MORPHOGENESIS IN THE HISTORIC DISTRICTS OF DAYTON, OHIO. Beverlyann Dooley, Wright State University, Dayton, OH 45435

This paper is a response to the nationwide spread of historic districts. It examines a number of historic districts in Dayton, Ohio to demonstrate the inadequacy of gentrification to explain the current phenomena of urban revitalization in these specially zoned areas.

Gentrification is a stimuli that can spark urban upgrading. But change is a 'stop and go' process. Effective renovation depends less upon a scheme of city planners than spatial distribution. Interpretation of the urban neighborhood landscape and knowledge of the history and background of the original homeowners presents a roadmap to better understanding effective morphogenesis.

9:30 THE COUNTY ORIGINS OF OHIO'S SETTLERS BY 1850. Gregory S. Rose. The Ohio State University at Marion, Marion, Ohio 43302-5695.

Examination of Ohio's 1850 census, the first to ask nativity, has determined the state or country of birth for settlers and revealed migration and cultural patterns. Non-census records are valuable for migration research because some more precisely identify origins, by county or town, and because some identify counties of birth and residence prior to migration to Ohio. The disadvantages of non-census records are that they do not cover the entire population and that those included are not necessarily socioeconomically representative. This paper will use two non-census records, Registers of Receipts from the General Land Office, and the Pioneer Card File from the Ohio Genealogical Society, to determine the origins of Ohio's settlers by 1850. The Registers identify the county of residence for purchasers of government lands, and the Card File identifies county of birth and prior residence for those settlers whose descendants have submitted genealogical information. Three generalizations about migration are drawn from these records. Settlers tended to be born in and migrate from places basically directly east of their settlement destinations. Prior residences tended to be relatively close to Ohio, such as in western Pennsylvania. For those settlers whose birthplace and prior residence are known, they tended to have been born farther east than the county they migrated from.

9:45 WHAT"S IN A NAME? OHIO TOPONOMY. Allen G. Noble, Geography Department, The University of Akron, Akron, Ohio 44325-5005.

Toponomy is the study of place names. Ohio's toponomy is surprisingly poorly studied, and yet its place names are rich with history, ethnicity and wit. In the main, Ohio's place names follow the patterns of most American places. The pre-existing Indian names persist as a base upon which later names have been layered. A large number of place names reflect first settlers, land surveyors and those who become wealthy early. Some names convey geographical characteristics, and community designations often reflect the geographical and ethnic origins of early settlers. Although not as abundant as in upstate New York, classical derivations of names are important in Ohio. Place names are not always reliable geographical indicators as a survey of "The Salems" demonstrates.

10:00 LANDSCAPE AS INDUSTRIAL ARTIFACT: SOUTHEASTERN OHIO REVISITED. Richard Francaviglia. Ohio Historical Society, 1982 Velma Avenue, Columbus, Ohio 43211.

Today, Southeastern Ohio appears deceptively agrarian, but eighty years ago industry was very much in evidence: Coal and iron mining and refractory industries created a distinctive cultural landscape based on the exploitation of the region's mineral resources. This paper describes several aspects of the built environment (including housing, commercial and industrial architecture, and mining-related topography) that are tied to the region's industrial past. The presence of vestigial features, such as "boom town" commercial architecture, former company housing, abandoned coal tipples, and gob piles, is diagnostic; their location in a setting of marginal farms and second growth forest underscores the region's industrial decline since 1930.

10:15 A VIRGINIA I HOUSE IN SOUTHERN OHIO: THE VERNACULARIZATION OF AN ELITE FORM. Hubert G.H. Wilhelm, Department of Geography, Ohio University, Athens, Ohio 47501-2979.

The settlement of Ohio included diverse American migrant groups from the Northeast, East, and South. Virginians comprised the majority of Southern settlers and they, as well as those from other parts of the country, introduced traditional traits into Ohio. Among the most diagnostic of these houses are barns and Southerners came with a rich heritage of regional architecture.

One particular house is especially representative of Virginia settlement in Ohio. That type is a stylish I house with double porch, central dormer, low pitched roof, gable-end chimneys, and raised basement or crawl space. This house and its appurtenances appears to have its roots among the estates of the Tidewater and Piedmont areas of Virginia. Because this house was environmentally well adapted to warmer and humid conditions and was identified with agricultural success and status, it quickly achieved vernacular importance. It can be traced from the East into the hills of western Virginia (present West Virginia) and eastern Kentucky from where it made its way into Ohio. Today, it survives as a characteristic landscape element representative of Virginia settlement in southern Ohio.

10:30 FROM A TO B, ASHTABULA COUNTY TO BELMONT COUNTY: AN EXAMINATION OF OHIO'S EASTERN SETTLEMENT FRONTIER.

David T. Stephens, Geography Department, Youngstown State University, Youngstown, OH 44555.

Two important routes of cultural diffusion crossed eastern Ohio between limits formed by present day Astabula and Belmont Counties. The northern route, through New York and then along the shore of Lake Erie, was an avenue for the westward progression of New Englanders and their influence. Forbe's Road, Braddock's Road--later the National Road--and the Ohio River provided a route west for people and cultural baggage from the Middle Atlantic. On maps depicting cultural regions, eastern Ohio is generally shown as a transition zone. This paper investigates that transition zone by examining the origin of early settlers, the land alienation process, the establishment of settlements and selected aspect of material culture. The results of the study suggest that the Middle Atlantic may have been a more important cultural imprinter of this region than was previously supposed.

10:45 Special Session on Ohio's Cultural Geography. Alvar W. Carlson (Discussant)

F. Geography
First Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 014
Henry Moon, Presiding

2:00 CREATING AN AUDIO-VISUAL DISPLAY FOR OLD WOMAN CREEK NATIONAL ESTUARINE RESERVE IN HURON, OHIO.

Leonard Peacefull, Dennis Horan, Dorthy Miller. Firelands College, BGSU, 901 Rye Beach Rd. Huron, Ohio 44839

Climate variations play an important part in the yearly cycle of an estuary. How can these events be portrayed to occasional visitors to the Old Woman Creek National Estuarine Reserve Visitors Center? With a grant from the National Oceanic and Atmospheric Administration, a one year's photographic record was kept to document these changes. A short eighty slide audio-visual presentation was the resultant product together with a database on the changes occurring in the wetlands. The photographic record showed two major impacts throughout the year on the wetland; seasonal storms and the building and opening of a barrier beach, or nehrung, across the mouth of the creek. This presentation will address the problems of establishing this research project and show some of the photographic data collected.

2:15 THE CLIMATOLOGY OF RAINFALL IN OHIO RELATED TO ATLANTIC TROPICAL CYCLONES.

Rebecca Ward and Thomas W. Schmidlin, Department of Geography and Water Resources Research Institute, Kent State University, Kent, OH 44242.

Atlantic tropical cyclones may move far inland across North America bringing extensive rainfall, often while merging with a disturbance in the mid-latitude westerly flow. Over the period 1871-1990, 43 Atlantic tropical cyclones passed within 180 km of Ohio. This research examines the 11 tropical cyclones that affected Ohio since 1955. These occurred from June to October with a median date of August 18. Landfall locations ranged from Texas to North Carolina but the most likely location was the western Gulf coast. Forward speed of the storms averaged 40 km/hr across Ohio and the average of the storm maximum rainfall in Ohio was 10.3 cm (4.0 in). The average direction of the storm track across Ohio was from the southwest. A gradient of decreasing rainfall from southeast to northwest across Ohio was evident in most storms. Rainfall associated with tropical cyclones comprised about 5% of the annual precipitation in southeast Ohio in years with tropical storms.

2:30 SURFACE OZONE IN SOUTHEASTERN OHIO

Bradley C. Thomas, PO Box 6, Millfield OH 45761

The spatial and temporal distribution of surface ozone in Southeast Ohio as measured at Athens, Ironton, and Marietta from July 1, 1990 to Oct. 31, 1990 is presented. Data collected for one year at the Athens site is analyzed to discern the annual cycle of ozone in the region. Distinct meteorological parameters are recognizable in the daily patterns of ozone concentration with all three sites showing a high degree of similarity. The synoptic meteorology associated with the daily patterns is discussed with consideration given to the differing geography of the three sites. Analysis of data collected at nighttime (0000EST to 0600EST) during quasi-stationary high pressure systems provides a comparison of the strength of the ozone sinks at the three sites.

2:45 COASTAL SAND DUNES OF THE LAKE MICHIGAN BASIN.

William R. Buckler. Department of Geography, Youngstown State University, Youngstown, OH 44555-3317.

Along the eastern and southern shores of Lake Michigan sand dunes of impressive dimensions alternate with shorelands constructed of glacial drift and lacustrine materials. Collectively, these eolian deposits represent the largest accumulation of dunes along any freshwater body in the world. Presented is a classification system of these dunes that is based on form, relative relief, orientation, arrangement, and relationship of the dune assemblage to the underlying formation. The system is objective in that it relies on morphologic and geometric patterns which can be interpreted from stereo-paired aerial imagery at a scale of 1:24,000 and larger. Eight different dune forms are recognized: linear dune ridge, sinuous dune ridge, dune terrace, dune platform, parabolic dune, complex dune field, marginal sand apron, and interdune lowland. Each form or assemblage of that form may be expressed as having low, moderate, or high relative relief. The dune form may display a trend that is parallel, arcuate, perpendicular, or oblique to the present shoreline. And within a given assemblage a single or multiple number of a specified dune form may be designated. An individual dune or dune assemblage may reside within the general beach zone or may appear climbing up, perched on top of, or falling off of, nondune formations.

3:00 A ROLE FOR LOCAL GOVERNMENT UNITS IN THE OHIO NONPOINT SOURCE WATER POLLUTION MITIGATION SYSTEM

Chand Wije, Department of Geography, Kent State University, Kent OH 44242

Blueprints for nonpoint source water pollution control in Ohio stress the important role local government units play in mitigating nonpoint source water pollution. However, an examination of the plan implementation process reveals an absence of attention to the steps, if any, taken by local government units to reduce water quality degradation within their jurisdictions.

Taking the Cuyahoga River Basin (which encompasses nearly 100 local government units) as a case study, the paper demonstrates the need to add local government institutional data in nonpoint source water pollution control systems in Ohio. These data will function as a feedback loop among components of the system such as plan evaluation and problem definition. It will include data on local government units' response to water quality problems. Such data will help to improve efficacy of water quality plans in several ways.

3:15 SPATIAL IMPLICATIONS OF OHIO'S SOLID WASTE MANAGEMENT PROGRAM. Dr. Henry Moon, Department of Geography and Planning, The University of Toledo, 2801 West Bancroft Street, Toledo, OH 43606.

Ohio's first solid waste law was enacted in late 1967 in response to over 670 open dumps in the state and increasing environmental awareness/concern. The law mandated permit and inspection procedures for all dumps, operating until 1976 when revised. During this period, the Ohio Environmental Protection Agency (OEPA) was created, replacing the state's Department of Health as the official agency in charge of environmental monitoring. Landfill "tracking" began in 1980 and public awareness increased to a level necessitating more stringent state guidelines. House Bill 592 was signed into law on June 24, 1988 requiring a statewide solid waste management plan, single or joint county solid waste management districts, and adherence to a specific implementation timetable. Three levels of implementation based on district population determined the time allowed for the submission of management plans with less populated districts in the lead. The goals of HB 592 are 1) reduced reliance on landfills and 2) the three r's of modern waste management - reduction, recycling, and reuse. Implementation of this law will impact every household, agency, and firm in Ohio based on their location and the configuration and size of the surrounding management district. While the law is uniform across the state, location has significant and measurable impacts on actual solid waste management practices.

3:30 PROBLEMS IN THE APPLICATION OF AERIAL PHOTOGRAPHY TO CULTURAL LANDSCAPE ANALYSIS: THE EXAMPLE OF AMISH FARMSTEADS IN HOLMES AND MADISON COUNTIES, OHIO. Brian Okey, Dept. of Geography, Miami University, Oxford, OH 45056

Research was undertaken to determine the degree to which Amish farmsteads are distinguishable on aerial photographs. Specifically, normal color 35mm ASCS slides were emphasized. Eastern Holmes County, the original site of Amish colonization in Ohio, and Darby Township in northern Madison County, location of an offshoot of the Holmes County settlement, were chosen as study areas. Both contain Old Order Amish, the most conservative branch of Anabaptists and the least open to modern technology.

Amish landscape features associated with manual and horse-driven labor, self sufficiency and diversity, and barn and building styles were evaluated as interpretive indicators. However, several of these traits are exhibited by non-Amish neighbors as well. Furthermore, limitations of the slides themselves present additional hurdles. Equipment and building detail is inadequate without extreme enlargement. ASCS inventory flights take place once annually, and thus, miss many distinctively Amish activities such as those occurring during harvest. It would appear that color 35mm ASCS slides alone are insufficient in accurately locating Amish farmsteads.

3:45 ARE WE LOST? GEOGRAPHY LITERACY IN AMERICA AND AT WAYNE COLLEGE. Gary Graham, 2256 Christmas Run Blvd. Wooster, OH 44691

One in seven Americans can't identify where they live on a world map. One in four can't distinguish between the Pacific and Atlantic Oceans. In a Gallup poll, America ranked sixth out of nine countries tested on map identification. The 18-24 year-old age group from America scored lowest among all tested. A replica of the Gallup National Geographic test was administered to 100 students at Wayne College-The University of Akron in order to compare their geographic skills to the original test group. Like the Gallup findings, Wayne College scores were high in proximity identification (no one incorrectly identified Canada and only one respondent misidentified Mexico). Countries most frequently misidentified by Wayne College students were Sweden (70%) and Germany (66%). Ironically, Swedes in the 18-24 age bracket scored highest on the original Gallup survey. Only 51% of Wayne College students could identify Vietnam on a map; in contrast, only 38% of Russians polled could identify Afghanistan on a map, despite their lengthy war in that country. Overall, Wayne College students identified 73% of the countries correctly (the American average was 54%).

F. Geography
Second Afternoon at 2:00 pm
SATURDAY, APRIL 27, 1991
University Hall 066
David Stephens, Presiding

2:00 SITE EVOLUTION OF THE FLEA MARKET: 1950-1990. Jeffrey J. Gordon. Dept. of Geography, Bowling Green State University, Bowling Green, OH 43403.

Early U.S. flea markets were innovative attempts by auctioneers to move in a new economic direction during their off season. By gathering dealers in one location for one day, a new marketplace was created where dealers could sell their wares to the public and each other. Located outdoors, often in farm fields, these successful experiments quickly evolved into periodic markets. They readily adapted to myriad sites used for other economic activities such as race tracks, drive-in theaters, and parking lots. On-site facilities, especially important in case of inclement weather, were also utilized such as schools, churches, and meeting halls forming indoor-outdoor markets. With greater acceptance and maturation, structures were built solely for flea market activity. At first these structures were rather inexpensive and crude such as tents and quonset huts. Later, more sophisticated buildings were erected which offered more amenities to participants such as showers, home delivery service for merchandise, and credit card facilities. Indicative of sustainable daily economic activity, some periodic flea markets have become permanent operations. Most recently a new form of the ubiquitous shopping mall has arisen: the antiques mall.

2:15 JUST-IN-TIME ORGANIZATION AND SUPPLIER: THE CASE OF HONDA. Eric S. Hartzell and Nancy R. Bain, Department of Geography, Ohio University, Athens, Ohio 45701-2979.

Developed by the Japanese, just-in-time organization has the component suppliers providing parts as needed to the main assembly plant. For the manufacturer, the just-in-time approach reduces inventories, increases flexibility, and maintains quality. For the worker, it expands the work tasks. For an area, it provides a modified locational relaitonship between parts mnaufacturers and the main plant, given the need for frequent, small deliveries and geographical proximity. This paper describes the evolving distribution of just-in-time industrial locations associated with the Honda developments in Ohio. Contrasts by technologically sophisticated and unsophisticated parts, by greenfield vs. brownfield locations, and by labor site characteristics are the foundation of the generalizations on the emerging geography of flexible specialization in manufacturing.

2:30 FURTHER REFLECTIONS ON OHIO'S MANUFACTURING FORMATION RATES. Bruce W. Smith and John Hiltner, Department of Geography, Bowling Green State University, Bowling Green, OH 43403

This paper is a follow-up to an earlier study which analyzed the geographic patterns of formation rates of manufacturing plants opened in Ohio between 1979 and 1988. In this paper, regression analyses are used to compare those factors associated with formation rates for "high tech" and "low tech" sectors in both metropolitan and rural counties.

The highest level of statistical explanation was obtained in the case of "low tech" industries located in metropolitan counties. Conversely the lowest coefficient of determination was obtained for "high tech" industries in rural counties. Furthermore, the significant independent variables varied among the four regression analyses. These results suggest that no one explanation of formation rates is applicable across all counties and industrial sectors. Consequently, policies to stimulate new manufacturing formations should not be applied uniformly across all counties and sectors of the state.

2:45 LOGISTICAL PLANNING AND MODELING APPLICATIONS AND CASE STUDY Alan D. Smith, Department of Quantitative Sciences, Robert Morris College, Pittsburgh, PA 15219-3009

Modeling of logistics and related systems require an under-

standing of the technological impact of innovation on business as well as understanding of quantitative modeling techniques. Individual firms try to discover and manage their comparative advantage with respect to product offerings in the market place through a logistics system. This paper emphasized the spatial components of operations logistics rather than the temporal demand concerns. Both the theory of polynomial trend surface and double fourier series analyses were developed as well as the use of appropriate computer software, to illustrate modeling techniques applied to logistics systems. The case study utilizes management science techniques to trend-fitting motor carrier transportation costs.

3:00 THE GARMENT INDUSTRY IN TAIWAN--PAST, PRESENT, AND FUTURE. Stephen S. Chang, Department of Geography, Bowling Green State University, Bowling Green, Ohio 43403.

The garment industry has been vital to the economic development of Taiwan. From the mid-1960's, with the opening of its first Export Processing Zone in Kaohsiung, Taiwan's garment industry grew rapidly. This growth was to a large extent a result of the influx of foreign investment, namely from Hong Kong, and with it know-how. By the end of the 1960's, Taiwan was one of the major garment producers in the world along with Hong Kong and South Korea. Throughout the decade of the 1970's and into the mid-1980's, competition between these three producers continued and was gradually challenged by other countries, especially China. At the present time, garment manufacturing represents a declining industry and will continue to shrink in the decade of the 1990's.

This paper examines the adjustments, changes, and fortunes of the apparel industry in Taiwan in the context of the evolving interrelationships of labor supply and cost, manufacturing know-how, quality of production, import quotas, available production capacity and international economics and competition.

3:15 DIVERSIFICATION AND COCOA IN BELIZE. Michael Emch 217 Shideler Hall, Miami Univeristy, Oxford, Ohio 45056

The newly independent nation of Belize (1981) is severely economically underdeveloped. Historically the Belizean economy was based on lumbering, but this industry has all but disappeared. The agricultural sector has been dominated by sugar for the past thirty years, but recent lowering of market prices has been disastrous to this industry. The Belizean agricultural sector has suffered markedly in the past because of reliance on one crop. Diversification can protect the economy from total collapse in the future. One crop which has a role in the diversification of the Belizean economy is cocoa. It was originally grown by pre-colonial Mayan farmers in the area. Since 1977, Hershey Foods Corporation has owned and operated a cocoa farm which is located in the Sibun River Valley south of Belmopan and is over 1800 acres. Hershey has also implemented an educational campaign with the goal of expanding local cocoa cultivation. In this paper I will discuss botanical aspects of cocoa farming as well as world market trends. I will then discuss the effects cocoa has on the Belizean economy including local employment and possibilities for expansion in the future.

3:30 SOURCE AREAS FOR BLACK STUDENTS ATTENDING STATE-ASSISTED UNIVERSITIES IN OHIO, 1989. Joseph G. Spinelli and Bruce W. Smith, Department of Geography, Bowling Green State University, Bowling Green, Ohio 43403

Earlier studies undertaken by the authors using 1982 and 1988 data on all students attending state-assisted universities in Ohio revealed spatial patterns reflecting a distance-decay factor at work. Each university was shown to have a "core" hinterland where it drew more than its proportional share of students. By using the same technique (a "market penetration index") for black students, the authors show that the prime hinterlands for Ohio's schools are not as clear-cut, mostly as a result of the small numbers of black students in attendance at the twelve institutions under study. A gain or loss of only a few black students from a particular county to a particular university can skew the results of the market analysis.

3:45 BLACK COUNTRIES OF THE WORLD: A PRELIMINARY GEOGRAPHICAL REVIEW. Thomas D. Anderson, Department of Geography, Bowling Green State University, Bowling Green, Ohio 43403.

This examination of countries with largely black populations is part of a wider study of prospects for greater democracy around the world. Black means Congoid in race and includes people with African and Melanesian origins. The racial proportions for each country are derived from CIA assessments. Countries with 40 percent or more black or black-mixed peoples number 64 countries and 12 political dependencies. The populations of these countries totaled 515,815,000, with another 1,317,000 in dependencies. These political entities are examined and classified on the basis of a number of characteristics. These include: location, area, racial and ethnic diversity, population total, infant mortality rate, language, percent of literacy, per capita GDP, date of independence, and type of government. Several generalizations are part of a brief summary.

4:00 THE GEOGRAPHY OF THE AFRICAN DIASPORA Virginia M. Kerkheide, 4979 Lander Road, Chagrin Falls, OH 44022

The migration of Africans to the New World was begun by the Portuguese who had used Africans as slaves on sugar plantations on Madeira and Sao Thome in the Atlantic and then extended the slave trade to Brazil. As the demand for sugar increased in Europe, and the native American labor was decimated by European diseases to which they had no immunity, the need for African labor was greatly accelerated. The majority of the slaves came from the West Coast of Africa, an area similar in climate to tropical South America. Further, Africans were an agricultural people skilled in field work and easily adapted to the cultivation of sugar, tobacco, indigo, rice, and cotton. From approximately 1600 to 1850, upwards of 12 million Africans were forcibly transported to Brazil, Northern South America, the West Indies, and the United States. The number of African immigrants outnumbered Europeans by a ratio of 2 to 1. The products of their labor contributed to the wealth of the planters and European manufacturers, and helped to finance the Industrial Revolution. A comparison of each of the slave areas as to conditions of serviture, slave uprisings and revolts, the establishment of runaway communities, and the events which led to emancipation reveals interesting contrasts, and sets the stage for the integration of persons of African ancestry into the economic, social, cultural fabric of the Western Hemisphere in the 20th Cent.

G. Centennial Symposium
Forensic Sciences Symposium
Part 2 at 2:00 pm
SATURDAY, APRIL 27, 1991
Evans Hall Conference Room
Dr. James Y. Tong, Presiding

G. Centennial Symposium
Computers as Tutors at 9:00 am
SATURDAY, APRIL 27, 1991
Park University Hotel
Dr. Michael Klapper, Presiding

G. Chemistry
Only Morning & Business Mtg. at 9:00 am
SATURDAY, APRIL 27, 1991
Evans Hall Conference Room
Dr. James Y. Tong, Presiding

9:00 URINALYSIS FOR DRUGS IN THE WORKPLACE - MORAL AND EMPLOYEE RELATIONS CONSIDERATIONS. Raquel Diaz-Sprague, Technical Support Inc., 234 Oakland Park Ave., Columbus OH 43214-4122.

Psychoactive drug abuse by the American workforce is

presumed to be a part of a national drug abuse problem. Urinalysis as a condition of hiring for employment has become commonplace. To ensure the authenticity and integrity of the sample and the accuracy of the results, under forensic standards, the urine sample must be given "under direct observation" (DOD requirement) or in a "monitored toilet stall" (NIDA guidelines) followed by a temperature determination of the sample. Urinalysis offends many people's notions of privacy, freedom from unreasonable searches, and due process which are embodied in our nation's guiding documents. The vast majority of drug tests yield negative results. This does not mean the individual is or was "drug-free". Unlike alcohol determination in biological samples, the confirmed positive results of urinalysis for drugs do not indicate impairment. Given the relatively low value of the information obtained from testing, widespread use of urinalysis in the workplace raises ethical questions as to misapplication of chemical science in our society. Drug testing might undermine the mutual respect and personal consideration that is to be strived for in an employment relationship.

9:15 **PRESSURE DEPENDENCE OF THE DOUBLE ACCEPTOR Ga_{As} AND RELATED CENTERS IN Ga-RICH GROWN GaAs.** A. Kangarlu, H. Guarriello, R. Berney, University of Dayton, Department of Physics, Dayton, Ohio 45469-2314

Photoluminescence (PL) spectroscopy measurements have been carried out on LEC grown p-type GaAs under hydrostatic pressure. One of the samples, B, was intentionally Si doped. We observed peaks due to Ga_{As} in two samples, A and B, which were grown under Ga-rich conditions. In addition to that, in both samples another peak at 200 meV(in sample B) and 234 meV (in sample A) below the band edge has been observed at atmospheric pressure. The pressure dependence of all the observed peaks in both samples is measured. The analysis of the PL peaks indicates that the pressure induced shifts are linearly dependent on the energy separation from the GaAs Γ-conduction band edge emission. All the pressure coefficients are consistently lower for the deeper centers for pressures up to Γ-X crossover. We believe that the two deep centers (200 meV and 234 meV) are associated with the Ga_{As} defects. Their pressure dependence indicates association with the GaAs Γ-conduction band edge.

9:30 TIME RESOLVED INFRARED SPECTROMETRY USING A LINEAR ARRAY DETECTOR. Theresa Mooney, Hugh H. Richardson, Department of Chemistry Ohio University, Athens, Ohio 45701

A dispersive infrared spectrometer has been constructed which utilizes a 32-element InSb linear array detector to obtain real-time spectra. Spectra have been collected with 2% noise and 13 cm^{-1} resolution for a 4 μs collection period when using a IV signal. This spectrometer is now being used to study the flash photolysis of acetone. Gas-phase acetone is photolyzed with a laser beam in order to obtain kinetic information of the CO formed.

9:45 SYNTHETIC AND REACTION CHEMISTRY OF $(RC_5H_4)Ti(Cl)_2(t\text{-BuNH})$; R=H, CH_3. Dean M. Giolando, Lisa Graves and Kristin Kirschbaum, Department of Chemistry, University of Toledo, Toledo OH 43606-3390.

The title compounds, $(RC_5H_4)Ti(Cl)_2(t\text{-BuNH})$; R=H, CH_3, were prepared in 80-90% yield from the reaction of $(RC_5H_4)TiCl_3$ and Li(*t*-BuNH), and characterized by NMR, FTIR, and *X*-ray crystallography. The steric bulk of the *t*-Bu group is evident from both its orientation away from the Cp ligand and that the coordination sphere about Ti can accommodate only a single *t*-BuNH ligand. Our interest in these compounds stems in part from their being examples of organometallic early transition metal amide complexes. More importantly, the variety of functional groups offers a rich reaction chemistry: Ti-Cl group, nucleophilic displacement reactions; Ti-N group, amine elimination reactions; and N-H group, deprotonation reactions in the presence of other functional groups.

G. Chemistry
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

Board I @ 10:00 DERIVATIVE NEOPOLAROGRAPHIC DETERMINATION OF CHLORITE AT A HANGING MERCURY DROP ELECTRODE. Otis Evans, U.S. Environmental Protection Agency, Environmental Monitoring Systems Laboratory, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268

The polarographic reduction behavior of chlorite is investigated (in Britton-Robinson buffer) in the range of pH 3-12. The optimum pH for the determination of chlorite is approximately 3.5 to 4.5. The peak potentials for the reduction of chlorite at the hanging mercury drop electrode (HMDE) are an S-shaped function of pH. From pH 7.5 to pH 12.0 the polarographic peak potential is virtually constant at approximately -1.10 V vs. saturated Ag/AgCl reference electrode. The current response from pH 4-12 is also an S-shaped function of pH and is the sigmoidal complement of the peak potential pH curve. In addition to defining its behavior, chlorite is determined in various aqueous solutions. The effects of metals, complexing agents and chlorine dioxide on chlorite determinations are presented.

Board J @ 10:00 CHEMICAL PREPARATION OF SEMI-SYNTHETIC ENZYMES. Marcia A. Hintz, David E. Albert and Melvin H. Keyes. Anatrace, Inc., 1280 Dussel Drive, Maumee, OH 43537.

Semisynthetic fluorohydrolases have been prepared by conformational modification of bovine pancreatic ribonuclease (RNase). After perturbing the structure of the protein by exposure to pH 3.0, RNase was modified with hexamethylphosphoramide (HMPA) followed by crosslinking with diimidates of various chain lengths. The maximum fluorohydrolase activity was measured when dimethyl pimelimidate was used as the crosslinker. This semi-synthetic enzyme hydrolyzed both phenylmethylsulfonylfluoride (PMSF) and diisopropylfluorophosphate (DFP).

Board K @ 10:00 EFFECT OF PH ON THE DEGRADATION OF ATRACURIUM. David Balshas and John Lutton. Chemistry Department, Kenyon College, Gambier, OH 43022

The rate of degradation of atracurium, a non-depolarizing neuromuscular blocking drug, was investigated as a function of pH using reverse phase HPLC with fluroescence and UV detectors. Present evidence supports two possible modes of degradation: enzymatic hydrolysis by serum esterase or a nonenzymatic Hofmann elimination reaction. Both the rates of the esterase reaction and of the Hofmann elimination reaction were followed in model serum systems. At physiological pH, the observed rate constant for the esterase reaction was approximately four times greater than that of the Hofmann elimination reaction. However, at pHs below 6.6 or above 8.0, the Hofmann elimination reaction became the predominant mode of degradation of atracurium. In summary, the evidence supports the contention that atracurium is predominantly metabolized by an esterase mechanism and not by a Hofmann elimination reaction.

Board L @ 10:00 IN VITRO FERMENTATION OF HIGH PROTEIN CONCENTRATES CAUSING BOVINE BLOAT. Lorrie Reeves, 10699 Payton Lane, Leesburg, Ohio 45135

Bovine feeding programs with little roughage have been tried with varying degrees of success. However, they all have been troubled with bloat and founders that are associated with high protein concentrate, low roughage Bovine diets. A three step experiment was conducted by in vitro fermentation using the natural digestive fluids collected from slaughtered bovine. Actual gases were produced and then measured by water displacement. First a control was established in order to determine the normal amount of gas produced in the rumen. Next three different ratios of cracked corn and high protein concentrate were

tested. The three different ratios are: one to four, one to seven, and one to twelve. In the last step the results were compared. The results were surprising. The one to four and one to twelve ratios produced huge amounts of gas. Amazingly enough, the test showed the one to seven ratio produced the least amount of gas, showing that possibly too much, as well as not enough protein could lead to excess gas production. The results are interesting and unexpected. Further research is needed.

H. Science Education
First Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 047
Rebecca Stricklin, Presiding

9:00 "JUMP-START" ELEMENTARY SCIENCE EDUCATION

Paul Cover, 3572 Ridgewood Dr., Hilliard OH 43026

If your reliable, old car fails to start on a cold morning, you can appreciate the value of a transient burst of added energy. So it may be for elementary teachers trying to initiate "science literacy" in future scientists, or even voters.

Such bursts of energy FROM scientists may be recruited among local businesses. Many firms employ scientists and engineers. They are waiting for invitations to share their talents with school children. (A local example is the Columbus "Adopt-A-School" program.)

Most of these volunteer speakers have immense knowledge and are anxious to convey their enthusiasm for science and mathematics. This contagious joy (i.e., FUN) from creating new knowledge or structures is rarely revealed in the busy classroom.

However, with only brief responsibilities, these speakers may spark a rare insight for either the need or the pleasures of scientific literacy!

Please: Recruit evangelists for science!

9:30 SCIENCE & READING: IT'S IN THE BAG

Terressa Dennis and Aurthur Vorhies
Ohio University-Chillicothe, 571 West Fifth St. Chillicothe, Ohio 45601

To facilitate the teaching of hands-on science in the elementary school, a former fifth grade teacher and a university science professor have created science learning kits for classroom use. Elementary teachers often feel uncomfortable teaching science and have difficulty integrating science with other disciplines. Each reading-science kit includes trade books, science activities, and materials related to a specific scientific concept. By using the kits, students are applying reading strategies and skills while learning science. The materials and activities included allow the students to experiment and see for themselves how the concept works.

In many cases elementary teachers are exposed to teaching science in one under-graduate methods course. Many science activities require materials that are not readily available in the classrooms. Although accessible and inexpensive, the materials require time to assemble. Often, with preparation in many subjects necessary, there isn't time to gather these materials and science becomes a text-book subject. With the reading-science kit everything is ready for the teacher and/or student to become an active hands-on science learner.

9:45 AN INNOVATIVE EXPERIMENTAL SCIENCE CLASS FOR GIFTED AND TALENTED STUDENTS. Miles Free.

275 Rustic Rook, Chippewa Lake, Ohio 44215.

Encounters in Experimental Science was developed to bring the fun and excitement of hands on science experiments to the students participating in the Brunswick City Schools Pipeline for Gifted and Talented Program. The Encounters class gave the students the opportunity to demonstrate and prove scientific principles using commonly available materials such as string, bean bags, mousetraps, newspaper, yardsticks, steel wool, jars, balloons, rubber bands, toy cars, plastic straws, paper and Bart Simpson dolls. Students created partial vaccuums, made balances for comparing weights, and performed many other experiments.

Students enjoyed particularly making mousetrap powered vehicles, paper airplanes, and paper chromatography. Also a favorite experiment was a demonstration of seat belt effectiveness using an inclined ramp, a doll baby buggy, a rope tied to the axle, and the Bart Simpson doll.

A highlight of the class was the taking of high speed photos of balloons breaking.

Lesson plans, materials list, and a bibliography are available.

10:00 WOMEN IN THE SCIENCES - MARIETTA COLLEGE

George Banziger, Office of Continuing Education
Marietta College, Marietta, OH 45750-3031

In 1988 Marietta College, in cooperation with Marietta City Schools initiated a program called Women in the Sciences (WITS), which targeted high-ability female students and teachers of grades 5-12. About 101 students and 21 teachers participated in 8 day-long sessions, each consisting of discipline-focused discovery labs and coordinated sessions on math, careers, and adaptive skills. The program was designed to enhance interest and skills of young females in science and engineering and contained the following elements: The use of math as a gatekeeping skill to science and engineering, a small-college setting, hands-on activities with in-depth science projects, and cooperative learning. A 1-year follow-up evaluation indicated noticeable impact of the program on interest in science careers and on skills used in math and science classes. In 1988-89 teacher inservice sessions on instructing females in science and math were held. Summer sessions for students in grades 5-9 were conducted in 1989 & 1990 and sustaining activities during the school year have been arranged. A recipient of two grants each from the Ohio Board of Regents and the M.H. Jennings Foundation, WITS was the 1989 winner of outstanding non-credit programs from the North American Association of Summer Sessions, a two-time finalist in the education excellence award of the Consolidated Natural Gas Foundation, and a finalist in the Merck Foundation Centennial Award.

10:15 OHIO UNIVERSITY-CHILLICOTHE: A SCIENCE EDUCATION RESOURCE CENTER

Arthur Vorhies and Terressa Dennis
Ohio University-Chillicothe, 571 W. 5th St., Chillicothe OH 45601

As part of a strategic plan for Ohio University-Chillicothe to become a regional resource center, a science education resource center for area public schools has been developed with funds provided by an Ohio Board of Regents Academic Challenge Grant. The purpose of this science resource center is to provide area schools with a liaison from a major university, thus providing public schools and their faculty with shared expertise, equipment and/or supplies not normally within the budget of these schools. The focus of the science resource center is on elementary and middle schools. The purpose is to enhance science education by assisting faculty in these grade levels to prevent isolation, preparation difficulties, and overall "educator burnout" in the science areas. Major features of this program are: university faculty assistance to public school faculty, preparation of requested labs, weekly delivery, set-up and pick up of equipment and supplies, instruction on a request basis in areas of computer usage, laser disc technology, and current audio-visual techniques. This program is also integrated with other regional resource centers at OU-C--mainly the education and language arts center to meet the goal of wholistic education for area students. This regional resource center concept provides added dimensions for the traditional science curriculum.

10:30 THE MUSKINGUM COLLEGE EARTH SCIENCE FIELD EXPERIENCE, 1990. KOVACH, Jack, and Eric LAW,

Geology Department, Muskingum College, New Concord, OH 43762

In August 1990, with financial support from the Ohio Board of Regents, the Muskingum College Geology Department conducted a 10-day program (Earth Science Field Experience, 1990) in which 17 science teachers in elementary and secondary schools in southeastern Ohio were afforded the opportunity to obtain hands-on experience in geological field methods and to gain a better understanding and appreciation of the geology and geologic history of Ohio and the Appalachian Mountain region.

The program, modified only slightly from a similar, and very successful, program conducted in 1987, began with 2 days of classroom work directed toward review/overview and discussion of fundamental geological principles and processes and a summary of the geologic history of Ohio. The remainder of the program was conducted in the field during the course of 5 days of field trips in Ohio and a 3-day trip through the central Appalachian Mountains.

The overall evaluation of the program by the participants was excellent, and we were encouraged by participants to continue to offer programs of this or similar nature.

H. Science Education
Second Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 051
Richard Benz, Presiding

9:00 SEEDLING GROWTH CAN BE MONITORED WITH A STUDENT-MADE BALANCE. Robert S. Platt. Dept. of Plant Biology, Ohio State Univ., Columbus, OH 43210.

There was a time when building your own measuring instrument was an important part of most scientific endeavors, but this art is disappearing from the liberal arts curriculum, especially for non-science majors. The study of seedlings, eg. mung bean sprouts, and growth controlling factors, eg. light or ethylene, becomes an opportunity for students first, to build their own analytical balance, and then to use it to measure plant growth under various conditions. A pedestal for the balance is a plastic bottle stabilized on a plaster base. The beam is cut from a thin wooden ruler 30 cm long, marked in millimeters. A fine sewing needle glued across the beam forms the fulcrum. Riders weighing 1, 2 and 4 gm may be cut from 12-gage Cu wire: 3.46 cm weighs 1 gm. A pan cut from thin aluminum is suspended by a 28-gage wire bridle. Sensitivity is controlled by the distance between the fulcrum and the center of gravity of the beam. With the fulcrum needle fixed near the top edge of the beam this balance can weigh up to several gm with a sensitivty near 1%. For larger weights (with larger riders) the sensitivity can be decreased by adding balast to the bottom of the beam. After taking aliquot fresh weights, the seedlings can be wrapped in Al foil, heated in an oven and weighed again to determine dry weights, which of course decrease for a week or more of "growth".

9:15 ECOLOGY SCAVENGER HUNT
Emily Rock, The University of Akron, Wayne College, 10470 Smucker Road, Orrville, OH 44667

The ecology scavenger hunt is an outdoor exercise designed for use in freshman level courses for biology majors. The objective is to further student appreciation of the elements and organization of ecosystems. Students are given a list of terms taken from course lecture material. The exercise site is a rural setting with diverse terrain including several ponds. Students are allowed one hour to locate specific examples for 18 of the 22 terms. Answers must include a description of the example and the reasoning behind the choice. Collection of actual examples is also accepted. Students are encouraged to include a description of the factors contributing to the niche of any species of their choice. Terms used in the exercise will be provided to the audience. Supervision and grading of the exercise will be discussed.

9:30 OCEAN FOCUS: INFUSING MARINE SCIENCE INTO INLAND CLASSROOMS. Cynthia C. Stong. Dept. Biol. Sci., Marine Lab, Bowling Green State Univ., Bowling Green, OH 43403-0212.

OCEAN FOCUS is a 3-year National Science Foundation funded teacher enhancement program providing marine education study for 40 teachers each year in Northwest Ohio. A successful pilot project and needs assessment study demonstrated the interest among inland teachers for this marine study.

OCEAN FOCUS provides intense coursework in introductory oceanography-marine biology, marine closed-systems, summer field study at Lake Erie (Stone Lab) and the Florida Keys, and a curriculum development workshop. Each teacher set up a classroom saltwater aquarium and wrote a curriculum unit during their year of study. During the fall, the grant staff visited each classroom to observe how the teachers integrated their new knowledge into their curriculum. Continued interaction during the school year has provided numerous examples of this exciting infusion of marine science into inland classrooms.

Both the teachers and their students will gain an increased excitement about science through "bringing the ocean into the classroom." This project will contribute toward alleviating the critical shortage of qualified precollege science teachers as well as a critical lack of understanding of marine sciences among inland teachers.

10:00 USING EVERYDAY PLANTS IN TEACHING BOTANICAL PHENOMENA. George K. Rogers, Cox Arboretum, 6733 Springboro Pike, Dayton, Ohio 45449

Even the most prosaic of sidewalk, vacant lot, and streetside plants can demonstrate surprising and eye-opening aspects of the plant world. In virtually any setting inhabited with plants occur species useful for showing adaptations related to light & water needs, pollination, dispersal, competition & herbivory, symbioses, succession, and additional ecological phenomena. Everyday species have intriguing histories in human affairs, or wonderous roles in medicine, or potential to cure, feed, fuel, or overrun the world. An alternative angle is to examine through environmentally attuned eyes human effects on the plants around us. This presentation supplies examples from commonly encountered plants in urban southern Ohio with the aim of offering teachers an enriched perspective on the weeds, shrubs, and trees in the schoolyard.

10:30 **HOW NONFORMAL EDUCATORS WHO HAVE DEPARTED FORMAL INSTITUTIONS PRECEIVE THE SUCCESS OF SCHOOLS TO PROVIDE HANDS-ON SCIENCE.** Betsy Feldkamp,1438 Waterworks Road, Newport, Kentucky 41071

A national survey was given to nonformal educators who once taught in formal institutions on their attitude of the feasibility of formal institutions to provide hands-on science activities for students. There is a great deal of encouragement for formal institutions, public and private schools, to have these types of experiences to improve cognitive and affective learning The results have been mixed. Many nonformal institutions, museums and outdoor education centers, etc., have proven success in providing hands-on science in exhibits, demonstrations, and classes. These teachers had the opportunity to observe both formal and nonformal systems in presenting science activities. The teachers felt that formal institutions did not allow sufficient preparation time, facilities, and administrative support. They felt hands-on was possible for formal institutions but not without vast changes in the system of teaching and administrative attitudes.

H. Science Education
First Afternoon & Business Mtg at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 047
Rebecca Stricklin, Presiding

2:30 CHEMCOM: THE NEW CHEMISTRY CURRICULUM FOR YOU! STRICKLIN, Rebecca E. Oak Hills High School, 3200 Ebenezer Road, Cincinnati, OH 45248

ChemCom (Chemistry in the Community) is the new curriculum developed by the American Chemical Society and a team of teachers from around the country that is a new approach in both the content and methodology used in teaching chemistry at the high school level. Subject matter is taught around societal issues in a group decision making mode. Participants will practice one of the special activities and receive information on the other new aspects. This is a MUST for teachers who are considering adopting ChemCom or are looking for an STS curriculum. Special handouts, courtesy of Kendall-Hunt Publishers, will be available to participants only.

3:30 **A SELF-BUILT SENSOR FOR COMPUTER INTERFACE AS HANDS-ON LEARNING EXPERIENCE.**

Pei-Hsing L. Wu* and Wei Y Chen, (*Teacher Emeritus, Grandview Hts., H.S., 160 Brookside Oval E., Worthington, Ohio 43085; and Beijing, PRC)

A heartbeat monitor can be built to interface an Apple computer in the science classroom. The sensor was put together simply and economically with an infrared, (IR)-light emitting diode, (LED) and a phototransistor as IR detector. By touching the sensor properly with a finger, heartbeat is detected by way of the pulsing capilliaries inside the finger tip. Good deal of interests can be generated by viewing the waveform tracing of the pulse on the screen. Not only one records the heartbeat rate visually, but also one notes variations in amplitude of the wave that reflects nerve impulses of the individual under test. This sensor can be introduced as an experimental exercise for the physics class while exploring electromagnetic waves and electronics. Biology students can be challenged to use this device testing subjects other than humans. The operation, two versions of circuit, assemby-language software, parts and the cost of this sensor will be presented and discussed. Our thanks to Dr. Lee Larson of Denison University for his advice.

4:00 **LASER-GENERATED HOLOGRAMS AS EDUCATIONAL TOOLS.**

Marvin David Sigal, Department of Life and Earth Science. Otterbein College, Westerville, Ohio 43081

The development of the hologram was made possible with the invention of the laser in the early 1960's. Holography is the recording, storage, and display of 3-dimensional visual information using laser light. White light reflection holograms can be viewed using a bright white light source such as found in a classroom or laboratory setting. The observed reconstructed holographic images represent the exact optical equivalent of the objects originally exposed to laser light. Hologram produce images that distinguish depressions, grooves, or cavities from raised processes such as bumps, ridges, or hairs. Additionally, the hologram can reproduce the reflective or lustrous properties of a shiny surface structure, such as the iridescent markings of various beetle or butterfly species. The images can also be examined within limits under a stereomicroscope without any loss of image quality or spatial detail. White-light viewable holograms are a medium of display for educational purposes that can stimulate student interest in the biological and physical sciences. The utilization of holograms in educational settings can increase the students' "image enhancement" of the subject under study, as well as their appreciation for the anatomical and spatial relationship of identifiable features that characterize an object's structure and shape.

4:30 DATA COLLECTION AND DATA REPORTING AS MAJOR COMPONENTS OF A REQUIRED UNDERGRADUATE LIFE SCIENCE COURSE. Robert Deal, David Todt, and Julia Basham. Division of Science and Mathematics, Shawnee State University, Portsmouth, OH 45662.

During each quarter, each student in the Life Science course, a component of Shawnee State Univesity's 50 credit hour general education 'Core', has been required to participate in an class-wide data collecting activity, then refine the collated data and develop a three-part (one table, one graph or histogram, and one data presentation of their own choosing) data report which is graded and competitively evaluated for special award.

The data collecting activity has changed each quarter; this has served to eliminate copying of past reports, adds freshness and originality to the activity for both students and faculty and emphasizes that real-life application of the scientific method is not something that is "cut-and-dried".

4:45 SYMBOLIC MANIPULATORS, SCIENCE AND MATHEMATICS Robert E. McNemar, Ph.D., President, Academic Consultants, 5618 Worcester, Columbus, OH 43232

Mathematics should be a means of access to the sciences, not an obstacle. The state of mathematics and science teaching and learning in the schools of the United States is receiving national attention. The general population, as well as the professional engineering community, have become concerned that mathematics, as it is presently taught in most schools, is a barrier for students who wish to enter the fields of science and engineering.

In the traditional mathematics courses, instead of devoting time to learning concepts and ideas that can be applied to science, too much time and energy is expended teaching students algebraic manipulations. Assignments and exams too often depend on students' algebraic skills and not on their aptitude to analyze and solve problems.

Achievement in mathematics for science requires a minimum of two attributes - algebraic skills and the ability to think abstractly. The use of symbolic manipulators - graphic calculators and microcomputers lowers the bookkeeping details of algebra. Released from the burden of computation both teacher and student are able to concentrate their efforts on content, ideas, and problem solving.

H. Science Education
Second Afternoon at 2:00 pm
SATURDAY, APRIL 27, 1991
University Hall 051
Richard Benz, Presiding

2:30 EFFECTIVE USE OF SCIENCE PERIODICALS IN THE UNDERGRADUATE BIOLOGY CURRICULUM. Francis Nussbaum. Kent State University, Tuscarawas Campus, New Philadelphia, Ohio 44663

Many students who enter college are unable to produce good term papers. This frustrates biology instructors who wish to accommodate "writing across the curriculum" goals in their courses. Therefore, alternatives to the term paper which foster writing development and emphasize critical thinking have been sought. An alternative which is easily implemented asks students to critique a series of articles from professional journals. Beneficial outcomes of this assignment which have improved students' scholarship include: learning to habitually use the campus library resources, gaining familiarity with professional periodical literature and its access indices, learning to logically organize information, learning to write a bibliographic citation, finding professional applications of the scientific method, and being challenged to analyze research reports and think critically about them. When consistently made a part of introductory college biology course requirements, doing critiques of professional journal articles prepares students for writing more successful term papers in their advanced courses.

2:45 WRITING ACROSS THE CURRICULUM IN FRESHMAN GEOLOGY. Kenton E. Strickland, Wright State University - Lake Campus, Celina, Ohio 45822.

All faculty at Wright State are encouraged to incorporate Writing Across the Curriculum techniques in order to improve student writing skills. In the geology department at the Lake Campus, we are having remarkable success and unexpected benefits.

The daily log book required of students serves as an exercise in free writing, with no risk involved. Synthesis questions from previous examinations are sometimes given as suggested topics, with better results in this "no risk" setting. Students, in committing thoughts to paper, often are able to discover answers or to clearly identify trouble spots. Students begin to lose their fear of writing.

Benefits for the instructor include the opportunity "to look into the student's mind," and to discover attitudes which may interfere with student abilities.

Experimentation with daily exercises in other skills, such as speaking and mathematics, is also taking place.

3:00 EXPLORING THE RELATIONSHIP BETWEEN THE NATURAL SCIENCES AND THE ARTS IN A CAPSTONE COURSE. J. Hambrook and G. McKenzie, Geological Sciences, The Ohio State University, Columbus, OH 43210.

National concern for improved understanding of science by non-scientists and a perceived need to improve the understanding of the arts by scientists have provided additional incentive for us to develop a multidisciplinary course on the biogeosphere. The proposed course will be team taught by a biologist and a geologist, with guest lecturers from the sciences and the arts and resource persons from the arts. Much of the

course will be a seminar in which students and faculty present and discuss topics such as: 1) evolution of human understanding and expression of the natural world, 2) form and patterns in landscapes, 3)form and function in the biosphere -- materials, role of fluids, and environmental adaptations, 4) patterns and processes in geologic materials, 5) interpreting the biogeosphere with computers, 6) art in the service of science -- botanical, geological, and medical illustration, 7) arts in science education, 8) music, literature, and film in science, and 9) creativity: the process and the product. Teams of students will research and communicate a scientific concept in an art form for show.

3:15 AN INTEGRATIVE, REQUIRED, UNDERGRADUATE LIFE SCIENCE COURSE: TWO YEARS OF EXPERIENCE. David Todt, Robert Deal, and Julia Basham. Division of Science and Mathematics, Shawnee State University, Portsmouth, OH 45662.

Shawnee State University has instituted a 50 hour general education requirement for all baccalaureate students. The core courses in this program are integrative in nature with empahsis placed on reading, writing, speaking, computing, and quantitative skills. In addition to these communication skills, the courses are integrated through the common use of the themes of global parameters, cultural contexts, ecological perspectives, ethical foundations, and aesthetic consciousness.

To achieve the above goals, the Life Science Core Course has actively involved students in: reading and discussing essays by Lewis Thomas, Aldo Leopold, and others; collecting, analyzing and presenting data from a variety of real world biologic phenomena; using a variety of scientific instruments in both the lab and field settings; and hearing expert presentations from a diverse group of faculty. A combination of large group lectures and small group activities/discussions have been used to deal with the large number of students in the course and the effort to maintain an active hands-on and minds-on approach. The course is evolving each quarter as a result of student feedback and efforts by faculty at refinement and improvement.

3:30 A HAZARDOUS MATERIALS MANAGEMENT PLAN FOR SMALL COLLEGES. Mary K. Linde, Ph.D., University of Texas Medical Branch, Department of Medical Technology, 11th and Mechanic Streets, Galveston, Texas, 77550-2774

Few small colleges or two-year colleges have implemented plans to comply with EPA, OSHA, or state regulations concerning hazardous materials in campus laboratories. Yet, it is expected that by the end of 1991, all state educational institutions will be regulated by standards equivalent to or more stringent than those of OSHA. Failure to maintain compliance with these regulations could lead to litigation. However, lack of funds and knowledgeable staff present major concerns for these small colleges.

In this paper, an overall Hazardous Materials Management Plan is outlined. This plan includes identification of responsibilities and liabilities, inventory of hazardous materials, disposal of non-essential hazardous materials, control of procurment, transport and storage, continuous monitoring and education of personnel and students concerning hazardous materials.

4:00 RESULTS OF A SURVEY OF BUSINESS AND INDUSTRY CONCERNING A PROPOSED TWO-YEAR ASSOCIATE DEGREE PROGRAM IN ENVIRONMENTAL HEALTH/TECHNOLOGY. Forrest J. Smith and Robert L. McElwee. Wayne College, The University of Akron, 10470 Smucker Rd., Orrville, OH 44667

More that 1500 businesses and industries were surveyed by a mailed questionnaire, which asked their needs and opinions concerning a two-year Associate Degree program in environmental health/technology. More than 100 responded. Questions asked in the survey included the status of environmental health functions which were already performed at their site, how their professionals had been trained, what post-secondary coursework was desirable in such a professional, and what sort of job availability and remuneration was likely in the Northeast Ohio area over the next five years. From willing respondents, a smaller committee of twenty representatives were invited to give further and in-depth help designing the program. This was done by means of a DACUM validation process of a proposed curriculum. The validation committe further pointed out that there are two sorts of environmental professionals needed--one to administrate and ensure compliance with regulatory agencies such as EPA and OSHA, and another to do basic, hands-on testing and sampling of various types of environmental data on site at their facility. Based partly on this input, the authors have begun to design the degree program.

4:15 SURVEY OF CREDIT REQUIREMENTS IN SCIENCE COURSES AT AMERICAN BUSINESS SCHOOLS Kenneth A. LaSota and Alan D. Smith, Robert Morris College, Department of Quantitative and Natural Sciences, Pittsburgh, PA 15219-3099

The competitive advantage many other nations have in the high tech arena, has generated interest as to whether our nation's business leaders are adequately prepared to do battle on this high tech playing field. This report examines the number of science courses apprentice business professionals take during their undergraduate years. Though the number of college credits a student takes is not a direct barometer of their ability to function in their profession, studies focusing on credit requirements for training teachers, for example, have provided insights into how teachers function once in the profession. To generate the data base for this study, a sample of 30 schools was selected from among 228 American undergraduate business schools ranked by the Gourman Report (Gourman, 1987). The schools selected were ranked 210 through 201, 100 through 91, 10 through one, and t - and F - tests were completed. No significant differences in science credit requirements were found. The average number of science courses for all three stratifications of business schools was a minimum of at least two required courses in the bachelor's degree. Notable exceptions were MIT with 16.7 percent of degree program devoted to science courses in the business curricula.

4:30 ENHANCEMENT OF THE MATHEMATICS PROGRAM AT A TWO-YEAR COLLEGE. Monica L. Harrison, Wayne College/The University of Akron, Orrville, OH 44667.

As a branch of the University of Akron, Wayne College offers the first two years of mathematics and engineering courses taught at the University, as well as remedial math and courses geared specifically for two-year Associate Degree programs.

Over the past several years, many changes have occurred in the mathematics curriculum at Wayne College. Math requirements at the university level were stiffened and new courses put into place.

During this same time period, Academic Challenge Funds were made available at the state level to all two-year colleges. Wayne College successfully applied for funding for an enhancement of the mathematics program through the creation of a Mathematics/Statistics Center and the hiring of a coordinator. This service is in addition to the tutoring already available to students in the College's Learning Center.

The Math/Stat Center is currently working jointly with a Mathematics Advisory Committee (MAC). Tutoring, workshops, and supplemental materials are provided by the Math/Stat Center. Courses are reviewed by the MAC and the Math/Stat Center coordinator(s). The author will describe the creation of a Math/Stat Center, its purpose and functions, and the role of a MAC in enhancing the math program at Wayne College.

4:45 USING SPREADSHEETS IN MATH AND SCIENCE CLASSES Tim Vierheller, The University of Akron - Wayne College, 10470 Smucker Road, Orrville, OH 44667.

The use of computer spreadsheet programs in the numerical solution of applied mathematical problems was examined. These problems included differential equations and their various applications. These include the following: examining the viscoelastic behavior of a polymer under constant strain using the Voight model and constant stress using the Maxwell model; a copolymer's composition dependence on monomer rate constants and feed composition; and the ecological predator-prey model of Lotka and Volterra.

H. Science Education
Third Afternoon (Symposium) at 2:00 pm
SATURDAY, APRIL 27, 1991
University Hall 043
Dr. Clifford Schrader, Presiding

H. Science Education
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

Board K @ 2:30 — THE USE OF ONE DAY AND THREE DAY DIETARY RECORDS IN COLLEGIATE CLASSES. D.M. Spillman. Nutrition and Food Systems, 164 McGuffey Hall, Miami University, Oxford, Ohio 45056.

A set of forms has been developed to help students determine their dietary intake and habits. First these forms, complied by the student, help the individual to focus attention on the foods consumed, amounts and the time of consumption. As the student progresses through the forms, they calculate percents of energy nutrients, as well as units of vitamins and minerals and finally to compare their intake to the Recommended Dietary Allowances (RDA). Self evaluations are very positively reviewed by the students, who frequently modify their diets or habits due to this learning experience.

A SET OF THESE FORMS IS AVAILABLE FREE TO ALL OHIO TEACHERS.

Poster Boards — PRESENTATIONS BY WINNERS OF 1989-90 BATTELLE AWARDS FOR PROFESSIONAL DEVELOPMENT.

In 1990 The Ohio Academy of Science and Battelle Memorial Institute selected the winners of the Battelle Awards for Professional Development. Battelle Awards for Professional Development -- an educational partnership of The Ohio Academy of Science and Battelle Memorial Institute -- promotes professional development of science and mathematics teachers. The Battelle Award winners who received a total of $12,500, will summarize their professional experiences this past year and be available to answer questions at the following times:

Board L @ 2:30 — Marilyne E. Shanks, Carrollton HS, Carrollton, $3,000 Science Teacher Award

Board M @ 2:30 — Delores J. Dugan, Margaret Spellacy Intermediate, Cleveland, $3,000 Mathematics Teacher Award

Board N @ 2:30 — Connie S. Hubbard, Minerva HS, Minerva, $3,250 School Science Award

Board O @ 2:30 — James Kozman, Franklin Heights HS, Columbus, $3,250 School Math Award

I. Anthropology & Sociology
Only Morning at 9:00 am
SATURDAY, APRIL 27, 1991
Bricker Hall 385
George DeMuth, Presiding

9:00 — BURNOUT, STRESS, COPING STRATEGIES AND HUMOR: THEIR PREDICATIVE RELATIONSHIPS IN SOCIAL WORKERS. Nuria Feit, Dolores Payne, Isadore Newman, Marvin Feit. The University of Akron, Departments of Educational Administration and Social Work, Akron, OH 44325-8001.

The study includes Field Instructors for The University of Akron, Department of Social Work and social workers in Social Service Agencies. The purpose of the study is to identify the relationship between Burnout, stress, and coping strategies and humor in social service workers and the intervention potential for administrators in planning staff training and development programs. A questionnaire was administered to the workers, which included the following instrument: Maslach - Burnout Inventory; Family Crisis Oriented Personal, Evaluation Scales (F-COPES); Rotter's Internal - External Locus of Control Scale; Rosenberg's Self-Esteem Scale, and humor was estimated based upon 3 items from previous research: Newman and Fiordalis, 1985; Newman, Koenig and Foerstner, 1985; Karle-Weiss, Newman, Sovchik, 1990.

9:15 — A PARENTAL INCENTIVE PROGRAM FOR CINCINNATI PUBLIC SCHOOLS. Frank T. Page. 3 West Central Oxford, Ohio 45056.

Little has changed over the last three decades in improving upward mobility for Cincinnati public school-children. The percentage of students progressing to the college level remains low, and dropout rates high. An analysis of data provided by Cincinnati Public Schools demonstrates that the lack of parental involvement in monitoring and participating in children's educations is one of the major factors in this unfortunate situation. A parental incentive program is proposed, using funds provided by Proctor and Gamble, that may provide a realistic solution to the problem.

9:30 — RESPITE CARE FOR FAMILIES: PROVIDERS AND USE - AN OVERVIEW. William F. Laurie, 15787 Forest Hills Blvd. Cleveland, Ohio 44112

Respite care is a new and evolving service. Most respite care services are being provided by state agencies and national organizations through local service providers in the form of personal care, companionship, and sitter services. The federal role has been generally limited to demonstration programs and tax credits.

Program information at the national and state level was limited on program expenditures, numbers and characteristics of families served, and the need for services. However, state officials, service providers, and parents indicated that the demand for services exceeded supply.

Officials suggested improvements: (1) new funds should supplement not supplant existing funds, (2) states should establish focal points for coordinating information and referral for services. Additional details will be presented on the 25 state survey and our synthesis of the literature.

9:45 — PROBLEMS WITH TWIN STUDIES
Timothy Coleman
12770 Westchester Drive
Pickerington, Ohio 43147

Twin studies promise to control genetic factors while environmental factors vary. Studies involving twins are appropriate experimental designs for sciences that deal with genetic and environmental problems. This study reviews the methodological design and implementation of these results. Twin studies are reviewed to describe these design problems. These problems are illustrated in a critique of studies in this area.

10:00 — LEAD POISONING TRENDS IN THE 20TH CENTURY
David Garber and Doreen Chamberlin Griswold
4891 Clark Station Road
Greenville, Ohio 45331

Lead poisonig is a disease that has affected both children and adults for centuries. While advances and discoveries have been made and programs implemented, the overall current status is far from satisfactory. The purpose of our study was to collect and analyze data from the 20th century in order to track possible trends of lead poisoning related to historical events that occurred in the United States. Methodology used was in the form of archival data recovery. An analysis of this data was then plotted on a time line against historical events. At the on set of the study, we hypothesized that levels of lead poisoning would increase during time of war and industrial climax. Due to the lack of consistent statistics, we were unable to soundly determine if in fact true trends did exist.

10:15 STATUS PASSAGE IN ADOLESCENT ALCHOHOLISM. Rupesh Jain, Rich Kimball, Brahmajee Nallmothu, Vimal Patel, Jeffery Schultz, and Richard O'Toole, Department of Sociology, Kent State University, Kent, Ohio, 44242.

Numerous explanations exist that describe adolescent alcoholism. Our research identified three major perspectives for describing the process of entry into alcoholism: Alcoholics Anonymous, medical, and psychosocial. Literature that described each of the three perspectives was analyzed. We used Glaser and Strauss' status passage theory to analyze similarities and differences in how the three perspectives describe the process of becoming an alcoholic. Our results indicate remarkable resemblance between the Alcoholics Anonymous and medical perspectives according to the properties of status passage theory. Both these perspectives contrasted with the psychosocial perspective. An attempt was made to assess the research support for each of the perspectives. The need for specific research as identified through this analysis is discussed.

10:30 RESEARCHING REASONS FOR THE INCREASE IN INCIDENCE OF CHLAMYDIAL INFECTIONS AMONG COLLEGE STUDENTS

Ada Igwebuike, Rupal M. Patel, Steven Seeker, Mona Vishin. C/O Steven Seeker, 114 Maryann Road, Tallmadge, Ohio 44278

This study attempted to determine why chlamydia is spreading at such an alarming rate. We utilized a factorial survey approach in which respondents (N=135) were given a set of 33 vignettes along with a knowledge test and a demographic questionaire. These vignettes posed hypothetical situations in which the following variables were manipulated: gender, age, SES, meeting place, sexual reputation, relationship and sex act. The respondent was asked to rate each of these situations as to the likelihood of the individual contracting chlamydia. Major findings were: 1. The sexual act was the most predictive variable of a respondent's reaction to the vignettes. 2. Respondents with medium and high knowledge were 4.7 and 8 times more affected, respectively, by the sexual reputation variable than low knowledge respondents. 3. Respondents belonging to a fraternity/soroity were 4 times, 28 times and 2.7 times more affected, respectively, by the gender, age and relationship of the individuals in the vignette, than those who were not members of a fraternity/soroity. Because a majority of people were classified as having high knowledge about chlamydia, we extrapolated that the reason for the uncontrolled spreading of chlamydia can only be explained by the health belief gap; actions refute knowledge.

10:45 A STATISTICAL COMPARISON OF HUMAN ELBOWS VERSUS ELBOWS OF KNUCKLE-WALKERS AND BRACHIATORS. Forrest J. Smith, Theodore M. Shaw, Kevin Feeman and Thomas Hammond. The University of Akron - Wayne College, 10470 Smucker Rd., Orrville, OH 44667

There is a controversy which exists in paleoanthropology. Did the ancestors of modern bipedal humans locomote by knuckle-walking, or were they suspensory creatures? Molecular studies have suggested that humans are very close to the knuckle-walking chimpanzee. However, anatomical studies of early Australopithecines suggest some distinct suspensory adaptation. Using measurements of the articular surface of the distal humerus, and multivariate statistics, this research supports the closeness between chimps and humans. Furthermore, it places the suspensory gibbons as a statistical outgroup. And, although it is unlikely that gibbons are in the direct ancestry of modern humans, there seems to be a different anatomical structure when comparing this particular joint surface to that of either bipeds or knuckle-walkers. Humans, chimps and gorillas show definite association, however. Further statistical operations typify the joint surfaces of each group, and speak to the issue of size gradation between the groups.

I. Anthropology & Sociology
Only Afternoon and Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
Bricker Hall 385
George DeMuth, Presiding

2:00 THE WESTERN LAKE ERIE ARCHAEOLOGICAL PROGRAM: A PROTOTYPE FOR THE FUTURE. Nancy Burnard. 1035 Vanderbilt Road; Toledo, Ohio 43615.

The University of Toledo and its Regional Archaeological Preservation Officer Program, in co-operation with students, community, and avocational support groups, has established a highly visible and successful co-operative research and education program which is 'Saving the Past for the Future'. The Western Lake Erie Archaeological Research Program at the University of Toledo, in co-operation with the Sandusky Bay Chapter of the Archaeological Society of Ohio, has in recent times established a model program emphasizing the integration of education and archaeological research. The University of Toledo graduate and undergraduate students, interested community members from northern Ohio and southern Michigan, and members of the Sandusky Bay Chapter have developed a series of programs dealing with field excavation, laboratory workshops, educational lectures and seminar sessions. Recently a co-operative "outreach" program has been established with the Port Clinton High School as a prototype for the establishment of Regional Archaeological Resource Centers. The involvement of community benefactors underwrites the program which encourages participants to extend their research across interdisciplinary lines.

2:15 "AN ARCHAEOLOGICAL IMPLEMENTATION OF THE TRIANGULATION MAPPING METHOD." Jeffery P. Scheff, The University of Toledo Archaeological Research Program, Toledo, Ohio 43606

Triangulation is a process of recording the positions of objects and feature areas in space. This method is especially useful in large areas where precise mapping equipment is lacking. It has recently been found useful as a time saving method in areas where large numbers of features are encountered. The process involves the establishment of two datum points in the field relative to a central fixed permanent datum. From these datum points, distances between each datum and the feature, respectively, are recorded. The resulting lists of numbers acquired in the field are converted to graphic maps using a compass. Triangulation has recently been implemented in excavations of the Petersen Site located in the Portage River valley of Ottawa County, Ohio.

2:30 MAGNETOMETER SURVEYS APPLIED TO PRELIMINARY INVESTIGATIONS OF ARCHAEOLOGICAL SITES IN NORTHERN OHIO

Mark F. Zakrzewski, The University of Toledo, Toledo, OH, 43606

Several archaeological sites in northern Ohio have been surveyed with a proton-precession magnetic gradiometer. A magnetic gradiometer measures & records slight variations in the magnetic field near the instruments sensors. At archaeological sites, magnetic field variations may be due to magnetic metal objects buried beneath the surface or other cultural features such as middens, fire pits, or disturbed soil. Such features can sometimes be detected because of their physical & chemical effects on magnetic minerals present in most soils.

Magnetic field surveys of archaeological sites are performed in a regular, gridded pattern whenever possible. The data recorded are corrected for temporal variations in the earth's magnetic field and are displayed on a map of the magnetic field intensity. These contour maps can be directed correlated with site maps to assist the archaeologist in locating possible features at the site. In the least, they may be used to identify those areas where the probability of finding large features in the subsurface is low, allowing the excavation efforts to be concentrated in more promising locations.

This geophysical technique has shown promise in its application to the prospection of several archaeological sites in northern Ohio. Because of rapid data output, this technique may be especially applicable to sites that are in the process of destruction or to those sites where access is limited.

2:45 "THE WEILNAU SITE (UTER280), UNIT S4W3, FEATURE 1: A PROBABLE HABITATION STRUCTURE OF EARLY ARCHAIC AGE." Timothy J. Abel and James R. Haas The Western Lake Erie Archaeological Research Program at The University of Toledo and The Sandusky Bay Chapter, Archaeological Society of Ohio.

Excavations this past fall at the Weilnau Site (UTER 280), located on the Huron River in north-central Ohio, disclosed a large circular feature, surrounded by what are interpreted to be postmolds. On the floor of this probable semi-sub-terranean structure, five projectile points and one surface hearth were encountered. Four of the five points resemble the St. Albans style common of the 9,000-

7,000 B.P. era, while the remaining point is weakly stemmed and weak shouldered. While root disturbance was observed, and features of later time periods intruded into the surface of Feature 1, observations of the in situ archaeological phenomena argues for the association of the Archaic projectiles with the structural feature. It is therefore argued that this feature represents a habitation structure of Early Archaic age, roughly between 9,000-7,000 B.P. Presence of the surface hearth suggests a winter occupation.

3:00 WEILNAU SITE
James R. Haas
4708 Old State Rd. Norwalk, Oh 44857

A co-operative research investigation consisting of the University of Toledo and the Sandusky Bay Chapter of the Archaeological society of Ohio, has documented evidence of four temporal occupations consisting of Archaic and Woodland cultures in the Sandusky Bay area. Research into the settlements has uncovered new information, previously undocumented in the area. Settlement information represents habitation structures and defensive palisade enclosures are present for the major occupations as well as ceramics, lithics, faunal and palo-batanical assemblages. The findings at Weilnau, are congruent with other major universities research into the Sandusky Bay area and are currently contributing to the further understanding of these cultures.

3:15 "THE SEAMAN FORT SITE(33ER85): A SIXTH CENTURY B.C. EARLY WOODLAND BASE CAMP IN THE HURON RIVER VALLEY OF NORTH CENTRAL OHIO." George B. DeMuth
The Sandusky Bay Chapter of the Archaeological Society of Ohio and The Western Lake Erie Archaeological Research Program at The University of Toledo.

Excavations this past summer at the Seaman Fort Site(33ER85),located on the Huron River in Erie County Ohio,yield new facts about this site and the Early Wooodland Time period.More than 100 Pits were Excavated during two seasons of excavations, of these over 50% have proven to be used as storage pits. These pits along with the five Early Woodland houses,and two related drainage trenches,point to a year around occupation.

3:30 INTRUSIVE MOUND: CULTURAL INTRUSION OR CULTURAL CONTINUITY? David M. Stothers (Ph.D.)
Director, The University of Toledo, Archaeological Research Program, Toledo, Ohio 43606

Traditionally, it has been argued that similar Late Woodland artifact assemblages associated with the Kipp Island phase of New York, the Wayne Mortuary Complex of Michigan and contiguous areas, and the Intrusive Mound Culture of Ohio and continguous areas, represent the migratory spread of population segments which radiate outward from New York State, to outlying areas of the Northeast and Midwest, as far distant as the Eastern Seaboard, the Ohio Valley and Indiana.

Based upon new and previous data an alternate interpretation is forwarded. Instead, it is suggested that these similar artifact assemblages resulted from panregional trade and exchange networks which cross-cut multiple archaeological phases, representing local populations/societies which were contemporary, but biologically, linguistically and culturally variable and dissimilar. These exchange networks are suggested to represent a continuation and outgrowth from earlier Middle Woodland exchange networks.

3:45 STRENGTH OF ETHNIC IDENTITY IN SOUTHEAST ASIA: TESTS OF THE STRUCTURALIST VIEW OF ETHNICITY.

Omar A. Barriga, Dept. of Sociology, Ohio State Univ., Columbus, Ohio 43210

The structuralist view of ethnicity, as described by Hechter, proposes that ethnic identity is the result of the structural conditions of a given society. Two hypotheses that emerge from this position are 1) that the strength of ethnic identity is affected by the politico-legal status of ethnic groups in a society, and 2) that different ethnic groups within a society have different levels of strength of ethnic identity. These hypotheses are tested using survey data on ethnic identity for college students in five Southeast Asian countries. The techniques used include analyses of variance and multiple classification analyses. The results are mixed yet interesting. The first hypothesis is supported for females but not for males. The second hypothesis is supported for males but not for females. These findings suggest that the issue of the effects of gender on strength of ethnic identity need to be investigated further in order to develop a better understanding of the factors that affect ethnic identity.

4:00 REFUGEE MOVEMENTS: AN EXPLORATORY ANALYSIS OF THE CAUSES OF, AND PROBLEMS RELATED TO DATA AND MEASUREMENT.

Susanne Schmeidl, Department of Sociology, Ohio State University, Columbus, OH 43210

This study is an exploratory analysis of the causes of refugee movements. Traditionally refugees were considered political refugees disregarding other possible factors causing refugee flow. Recent studies have criticized this monocausal view of refugee movements suggesting that they are caused by several factors. It is hypothesized that besides political indicators, economic and physical quality of life indicators are of importance in the emergence of mass exodus. Several zero-order and partial correlation analysis are conducted in order to test the hypotheses across time. The sample consists of 155 countries. The findings support the basic assumption that refugee movements are correlated with several political indicators. However, economic and quality of life indicators were also found to be important. Further, issues of refugee definition and the collection of refugee data are discussed.

4:15 WOMEN WORKING IN A MEN'S WORLD: THE EXPERIENCES OF FEMALE CORRECTIONAL EDUCATORS. Richard Tewksbury, Dept. of Sociology, The Ohio State University, Columbus, Ohio 43210

This paper explores the experiences of a sample of post-secondary educators in two close-security prisons in Ohio. Data come from in-depth, semi-structured interviews conducted with 17 female instructors. Analysis focuses on identifying patterned experiences and perceptions regarding perceptions by inmate-students and correctional administrators, as well as how recognition of these perceptions contribute to the construction of experience. Results suggest perceptions of stigmatization from institutional authorities and high levels ofappreciationand positive regard from inmate-students. It is the general belief of women working in this environment that they provide much needed elements of variation to the interactional experiences of incarcerated college students. Female post-secondary correctional eductors report experiencing high levels of satisfaction with their jobs and student interactions, but stress produced by the environmental constraints and attitudes of correctional administrators.

4:30 STAYING IN SCHOOL: ASSESSING ACADEMIC PERSISTENCE BEYOND THE SOPHOMRE YEAR

Canada Keck, Department of Sociology, Ohio State University, Columbus, OH 43210

This study tests a modified versiton of Tinto's (1987) model of departure decisions in college. The results are based on a survey of college sophomres at a large midwestern public university (N=636). Path analysis is used to explore a theoretical model of actual persistence in college beyond the sophomore year. Students who persist are compared to those who voluntarily withdraw. College GPA is found to be the best predictor of actual persistence, although social integration and faculty contact also have important influence. While this study found important gender, race, and socio-economic background differences in both integration into the universtiy system and intentions to persist, there were no such significant differences in actual persistence. This theoretical model has been used primarily to explain withdrawal after the freshman year in college. The results of this study indicate that although this model works reasonably well to explain later persistence/withdrawal decisions, additional factors are possibly overlooked.

J. Natural Resources
Only Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 028
Robert Vertrees, Presiding

9:00 DEVELOPMENT OF AN UNDERGRADUATE COURSE IN CONSERVATION/ENVIRONMENTAL HISTORY. John F. Disinger, School of Natural Resources, The Ohio State University, Columbus, OH 43210-1085.

Historical analysis of changes in societal perceptions of the environment provides the framework for a university general education course designed for undergraduate students majoring in natural resources. The course is also open to students from all other areas of the campus. Instruction focuses on perspectives on the relationships between humans and environment, starting from the exploration and settlement of the North American continent, continuing to the present, and projecting into the future.

Among major themes explored, primarily as they are interrelated with and influence one another, are those of manifest destiny, the cornucopian myth, transcendentalism, utilitarian conservation, preservation, and the concepts of natural resource/environmental management, sustainable development, and deep ecology. Original sources and historical/literary analyses provide the basis of the course reading list.

9:30 INDUSTRY ASSOCIATION INFLUENCE UPON STATE AQUACULTURE POLICY-- A COMPARATIVE ANALYSIS IN THE NORTH CENTRAL REGION. Susan K. Thomas, Robert L. Vertrees, Ph.D., and Donald W. Floyd, Ph.D. School of Natural Resources, The Ohio State University, 2021 Coffey Road, Columbus, OH 43210-1085.

States within the North Central Region of the U.S. differ considerably in their approaches to regulating the aquaculture industry. The purpose of this study was to explain these differences in terms of the potential of state aquaculture associations to influence state statutory and administrative law. Influence was defined in terms of each group's relative cohesion, power, and access to policy-makers. Member perceptions of group cohesion were measured using a Likert-summated scale administered to all association members via a mail questionnaire. Power and access variables were measured via telephone interviews with association presidents and other key contacts. Each association received an overall influence score, an aggregate of their cohesion, power, and access scores. Differences in state policy were assessed by means of a matrix. Relevant aquaculture policy sub-areas were identified and ordinal values were assigned to several possible policy alternatives within each sub-area. The matrix enabled the states to be ranked in order of increasing regulatory control. The degree to which the ranking of states by amount of association influence corresponds with the ranking by degree of regulatory control provides the basis for evaluating aquaculture association influence upon state policy.

10:00 RESULTS OF A QUESTIONNAIRE CONCERNING ATTITUDES TOWARDS HOUSEHOLD RECYCLING OF MATERIALS. Daniela Christopher. Wayne College, the University of Akron, 10470 Smucker Rd. Orrville, OH 44667

A survey was conducted concerning attitudes toward household recycling of commonly discarded materials. It had a series of closed-ended questions which included: the amount of disposable garbage produced per household per week, use of composting, and use and attitudes towards disposable diapers. It also touched on opinions concerning mandatory recycling, community recycling efforts, and rates of participation of respondents. Seventy-five percent of the people surveyed were college undergraduates, the remaining were from the general community. Most people (ca. seventy-seven percent) surveyed recycled at least one item, with metal beverage cans being the most popular, next was newspaper, then glass, then plastic. Unfortunately the existence of community recycling projects was not as high as individual recycling efforts. When asked their reasons for recycling, most people cited environmental considerations, with monetary reasons being second.

10:15 A TALE OF TWO COUNTIES--ALTERNATE APPROACHES TO RECYCLING. Kenton E. Strickland, Wright State University - Lake Campus, Celina, Ohio 45822.

Adjacent counties of Mercer and Auglaize in West Central Ohio have taken diverse approaches to recycling. Mercer began with grant monies for litter and waste management. They have a collection center with paid employees. Pick-up service is also available in a number of small communities. A bag system and sale of recyclables finance the operation.

Auglaize County began with volunteers, but later had to hire employees. There is no charge for the service. Financing has been based upon EPA fines and sale of recyclables. Each community has its own collection point with a central collection area in Wapakoneta.

As economic and regulatory conditions change, each strategy alternates in appearing to be most suitable.

J. Natural Resources
Only Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 028
Henry Smith, Presiding

2:00 SECTION J OF THE OHIO ACADEMY OF SCIENCE: ITS PAST IS PROLOGUE TO WHAT FUTURE? Sherman L. Frost and Robert L. Vertrees, School of Natural Resources, The Ohio State University, Columbus, OH 43210.

Thanks to Professor Ralph W. Dexter's "Conservation and the Ohio Academy of Science--An Historical Review" (Ohio J. Sci. 62(5):274-280), we have an excellent record for the years 1891 through 1961 of the Academy's many accomplishments pertaining to the science and practice of natural resources conservation, policy, and management. Since 1950, many of the Academy's endeavors along these lines have been undertaken by Section J, entitled Conservation (1950-1986) and Natural Resources (since 1987). Professor Dexter's article is being supplemented and updated by analyzing programs of the Academy's annual meetings since 1950 in order to reveal characteristics and trends in the Section's activities such as: the topics of symposia and contributed papers, the academic disciplines or fields of study of those who have presented papers, and the college, university, or other organizational affiliation of presenters. Through this historical overview, the authors hope to stimulate and organize discussion among Section members and other interested persons of implications that the Section's past has to its present status and future goals in terms of its unique and proper role, the size and composition of its membership, the types of symposia, papers, and other activities it should encourage, and other important matters.

2:30 ZEBRA MUSSEL (DREISSENA POLYMORPHA) MEDIA COVERAGE: A CASE STUDY. David Todt. Division of Science and Mathematics, Shawnee State University, Portsmouth, OH 45662.

The recent zebra mussel, Dreissena polymorpha, introduction to North America has created a great deal of media interest. This case study examined coverage of the zebra mussel story from four sources, national newspapers, national news magazines, local newspapers, and national television. Comparisons of frequency and content of coverage were made over a two and one-half year period beginning with the initial discovery of the zebra mussel presence in Lake St. Clair during the early summer of 1988.

Overall the zebra mussel story has been covered in an accurate and scientifically correct manner. Local media coverage is more significant than national coverage, with the story moving as the zebra mussels colonize new areas. The coverage seems to be evolving following a pattern: problems statments -> political involvement -> search for solutions. The newspapers tend toward single issue or event coverage, while the magazines give broader and more thorough coverage of the story. There has not been significant national television coverage of this story.

2:45 CHARACTERISTICS OF CORPORATIONS THAT UNDERWRITE ENVIRONMENTAL PROGRAMS ON PUBLIC TELEVISION. Barbara K. Garrison. The Ohio State University, 059 Ramseyer Hall, 29 W. Woodruff, Columbus, Ohio 43210.

This study addresses the question of whether there are characteristics common to corporations that underwrite environmental programs on public television. The literature review indicated that there was significant research on corporate giving in general, but that almost nothing is known about corporate underwriting of environmental programs.

An operational definition of 'environmental programs' will be developed and corporate underwriters of these programs will be identified. A questionnaire will be sent to each corporation identified and will be completed by the individual in the corporation's dominant coalition who is responsible for decisions on program underwriting.

It is expected that corporations underwriting environmental programs on public television will, among other things, (1) have mission statements that include environmental objectives, (2) believe that environmental program underwriting is an effective way to communicate their corporate social responsibility, and (3) believe that such underwriting enhances their public relations efforts. This study is expected to generate useful information for individuals and organizations interested in identifying new sources of corporate support.

3:00 ANALYSIS OF TREE ESTABLISHMENT ON STRIPMINED LAND IN SOUTHEASTERN OHIO, P. Olah and M. M. Larson, The Ohio State University, School Natural Resources, 210 Kottman Hall, 2021 Coffey Rd., Columbus, Ohio, 43210.

A field experiment to study the establishment of forest stands on surface-mined land evaluated tree species (white pine and green ash), minesoil types (topsoil and cast overburden), grading (standard and light grading), herbaceous mixtures (grasses and legumes), time of seeding in relation to tree planting and use of chemicals to reduce herbaceous competition to seedlings. Survival, vigor and annual growth of trees were measured as well as ground cover and biomass. After two growing seasons green ash, which showed sensitivity to simazine, performed well (97.8 percent survival), but not white pine (36.3 percent). Cast overburden was suitable for establishing ash seedlings and seeded grasses and legumes. Herbaceous ground cover was greatest on topsoiled plots but declined on standard graded plots. Herbaceous competition and minesoil type were the most important factors affecting tree survival.

3:30 NITRATE DETERMINATION IN RIVERS. M. Deibel, C. Ney, Capital University, Department of Chemistry, Columbus, Ohio 43209.

An ultra-violet (UV) method and a brucine method, developed from published procedures were used to determine nitrate levels in river water. Nitrate and organics absorb at 220nm, but organics also absorb at 276 nm and nitrate does not. Nitrate concentration was determined from a Beer's law plot constructed using standards. The absorbance used was that at 220nm minus two times the absorbance at 276nm, subtracting out organic interference. Brucine reacts with nitrate to form a complex that absorbs at 410nm. Nitrate concentration was determined from a second order curve derived from standards. The instrumental error for the HP8452A Spectrophotometer is 0.005 for absorbance. Although the UV method had an instrumental error of 0.1ppm, it was found to be highly reproducible. Brucine had an instrumental error of 0.025ppm, but procedural complexity made it less precise. For the UV method, the average of samples from the Olentangy River for October was 13.1ppm, November-12.8 ppm, December-13.1ppm. For brucine, the averages were November-12.07ppm, December-12.67ppm nitrate. This study shows the UV method to be a precise procedure for determining nitrate levels in Columbus rivers.

4:00 **POLICY IMPLICATIONS AND HEALTH IMPACTS OF GLOBAL ATMOSPHERIC CHANGE.** Christine R. Riddiough, Field Coordinator, Union of Concerned Scientists, 1616 P St. NW, Suite 310, Washington, DC 20036

This paper explores the policy implications of global atmospheric change with a particular focus on the health impacts of climate change. Over the last decade atmospheric scientists have developed models of the earth's atmosphere which indicate that emissions of gases such as carbon dioxide are changing the planet's climate. Recent studies suggest that a global warming of as much as 5 degrees centigrade may occur over the next 50 to 100 years.

These changes may result in adverse impacts on human health. In particular, temperature-related illnesses such as heart attack and stroke may increase, respiratory disease patterns may change as the atmosphere changes, and infectious diseases carried by insects and other species may spread as the range of the carrier grows. Nutrition-related diseases may also increase as agriculture is affected by changing weather patterns.

Environmental health scientists must further study these potential health threats. In addition, policies designed to reduce the possibility of such threats must be pursued.

K. Genetics and Cell Biology
Only Morning at 9:00 am
SATURDAY, APRIL 27, 1991
Townshend Hall 250
Mark Gorman, Presiding

9:00 MAKING A RFLP MAP IN LINUM USITATISSIMUM THROUGH UNDERGRADUATE EXPERIMENTATION. M Gorman C Caraballo and G Gahn. Biology Department, Baldwin-Wallace College, Berea, OH 44017.

The central focus of our molecular bio. course, as well as student research projects for the last two years, has been the contruction of a RFLP based linkage map in flax. This effort has been supported by NSF grant USE-895 1998 and a collaborative arrangement with Dr. C. Cullis at CWRU. Students in the molecular course do all of the steps in obtaining RFLP mapping data as regular lab exercises. These exercises include: extracting DNA from F2 plants, cloning random Pst I cut genomic fragments into plasmid vectors to form a library, screening the library for recombinants, using gradient ultracentrifugation to purify recombinant plasmids, making Southern blots of EcoRI cut F2 DNA, labeling purified plasmid probes, hybridizing the labeled probes to the blots and producing and analyzing an autorad. from the hybridization. Since RFLP mapping utilizes most of the major techniques of molecular bio, yet is based on principles of basic genetics, it serves as an ideal bridge between the two. While the classes have not yet produced much usable data, participation in ongoing research has been a stimulus, and several student independent projects have advanced the map. To date most of the random probes have shown an RFLP, and 5 linkage groups have been identified. We will report on the status of the map and on involving undergraduates with this type of research.

9:15 IN VIVO EFFECTS OF GENTAMICIN ON THE INITIATION OF PROTEIN SYNTHESIS IN ESCHERICHIA COLI. Kevin Violette and Rodney P. Anderson. Department of Biological Sciences, Ohio Northern University, Ada, OH 45810.

Gentamicin, an aminoglycoside antibiotic, is known to cause mistranslation of mRNA in prokaryotes and to inhibit translation. However, its effect on the rate of initiation of protein synthesis in vivo has not been determined. The rate of initiation β-galactosidase synthesis, which can be used as an estimate of the overall rate of initiation of protein synthesis, can be determined in E. coli by measuring the increase in β-galactosidase activity following induction of the lac operon. β-galactosidase activity was measured as a function of time after induction for cultures treated with varying concentrations of gentamicin and compared to not drug controls to determine a relative measure of the effect of gentamicin on the inhibition of initiation of protein synthesis. The results indicated that gentamicin inhibits the initiation of β-galactosidase synthesis in vivo in a dose dependent manner.

9:30 CANID VARIATION IN PHOSPHOGLUCOSE ISOMERASE, PHOSPHOGLUCOMUTASE, 6-PHOSPHOGLUCONATE DEHYDROGENASE, ACID PHOSPHATASE, AND ISOCITRATE DEHYDROGENASE

Anna O'Donnell[1] and Bonnie L. Lamvermeyer[2]
[1]Department of Biology, The College of Wooster, Wooster, Ohio 44691
[2]Department of Biology, Denison University, Granville, Ohio 43023

Three electrophorectic techniques - starch gel electrophoresis, isoelectric focusing (IEF), and polyacrylamide gel electrophoresis (PAGE) - were employed to investigate the presence of five genetic markers in domestic dogs and coyotes - phosphoglucoseisomerase (PGI), phosphoglucomutase(PGM), 6-phosphoglucose dehydrogenase (6-PGD), acid phosphatase (ACP), and isocitrate dehydrogenase (ICD). The study was done in an attempt to find a genetic marker that showed

consistent variation between the two species. This would enable a researcher to use a blood test to identify the canine species in question. Using specific stains for each enzyme, the following results were obtained. The three bands of PGI expressed strongly on both PAGE and IEF gels. However, expression was blurry and hard to score. Expression was seen for PGM, ACP, ICD, and 6-PGD on starch gels but was a broad smear, not a distinct band. Using PAGE and Coomassie Brilliant Blue R-250 stain, banding patterns for PGI, ICD, 6-PGD, and PGM were observed. PGI was expressed in three bands, the middle band occurring much broader than the other two. Nearly a dozen bands were visualized for ICD. 6-PGD showed three bands four to five cm. apart. PGM was expressed as a single band at about 13 cm from the origin. Towards the end of the study, coyote serum samples were run. Serum samples gave clearer banding patterns than whole blood samples due to dark background staining in the latter case.

9:45 ELECTROPHORETIC ANALYSIS OF POLYMORPHISMS OF HEMOGLOBIN, ALDOLASE, LACTATE DEHYDROGENASE, ISOCITRATE DEHYDROGENASE, AND SORBITOL DEHYDROGENASE IN CANIS FAMILIARIS AND CANIS LATRANS

Robert L. Schubert and Bonnie L. Lamvermeyer
Department of Biology, Denison University
Granville, Ohio 43023

Polyacrylamide gels (30.0% T, 2.00% C) were run in a Protean II electrophoretic apparatus at approximately 70 mA with 0.025 M Tris pH 8.3, 0.192 M glycine electrode buffer. Specific stains were used to expose the proteins in whole blood samples. Excellent results were achieved with lactate dehydrogenase, with Canis latrans samples (coyotes) displaying four bands with velocities in the gel of 0.11, 0.18, 0.24, and 0.31 centimeters per hour. While most Canis familiaris samples (dogs) showed only the three fastest bands, some dogs displayed a scarcely visible band even with the fourth and slowest coyote band. Two hemoglobin bands were found to move at 0.50 and 0.53 cm/hr in all samples. Aldolase and isocitrate dehydrogenase each migrated as one band in all samples. These moved at 0.07 and 0.19 cm/hr, respectively. Preliminary studies of sorbitol dehydrogenase showed three bands, at 0.011, 0.015, and 0.018 cm/hr.

10:00 ANALYSIS OF ESTERASE, LEUCINE AMINO PEPTIDASE AND GLUCOSE-6-PHOSPHATE DEHYDROGENASE POLYMORPHISMS IN CANIS LATRANS AND CANIS FAMILIARIS

Christine R. Smith and Bonnie L. Lamvermeyer
Department of Biology, Denison University
Granville, OH 43023

It is hoped molecular analysis of proteins in the genus Canis can provide better resolution of the origin, distribution, and hybridization of dogs, Canis familiaris, and coyotes, Canis latrans. The current method of classification, a morphometric analysis of twenty-eight skull measurements to differentiate species is time consuming and requires that the animal be dead. Positive identification of captured predators is useful from a legal standpoint, assessing responsibility for damage, as well as a scientific one, enabling geneticists to observe gene flow in populations over time. The enzymes esterase, leucine amino peptidase, and glucose-6-phosphate dehydrogenase were investigated in a search for species-specific polymorphisms in dog and coyote blood. Molecular separation techniques included isoelectric focusing of proteins in polyacrylamide gels as well as SDS gel electrophoresis. A thorough literature search of esterase, for example, revealed no experimentation on canids, however, polymorphisms were found in other genera such as Alaria marcianae (flatworms), Artemia salina (brine shrimp), E. coli, horses, and chickens.

10:15 GENETIC VARIABILITY IN MEMBERS OF THE GENUS CANIS

Kevin S. Eaches and Bonnie L. Lamvermeyer
Department of Biology, Denison University, Granville, Ohio 43023

A literature survey was performed to ascertain the current status of knowledge of genetic variability in four groups representing the genus Canis: dogs, coyotes, wolves, and jackals. Some work with protein polymorphisms of specific enzymes has been completed on selected groups of Canidae. Specifically, our lab has investigated acid phosphatase, aldolase, esterase, glucose-6-phosphate dehydrogenase, hemoglobin, isocitrate dehydrogenase, lactate dehydrogenase, leucine amino peptidase, phosphoglucomutase, 6-phosphogluconate dehydrogenase, phosphoglucose isomerase, and sorbitol dehydrogenase in dogs and coyotes. This work was compared with the technique of divergence among mitochrondrial DNA (mtDNA) genotypes as inferred from direct sequencing as well as restriction site polymorphisms in jackals and wolves. Experimental work in our lab employed the polymerase chain reaction to sequence the 18s ribosomal RNA gene isolated from Canis familiaris and Canis latrans blood samples.

10:30 ANALYSIS OF CICINDELA RELATIONSHIPS UTILIZING POLYACRYLAMIDE GEL ELECTROPHORESIS.

Laura Tuttle, Bonnie Lamvermeyer, and Tom Schultz,
Department of Biology, Denison University,
Granville, Ohio 43023

A preliminary literature review was conducted to examine existing information on the tiger beetle, genus Cicindela. While much past work has concentrated on morphometric analysis as a means of differentiating species, there has been a lack of available information on the beetles' molecular genetic status. However, molecular approaches are now being employed, using polymorphisms of enzymes to reanalyze relationships of species. The initial results of the literature survey indicate significant intraspecific variation as well as low genetic distances incongruent with comparative morphology. If effective, molecular differentiation could be useful in establishing evolutionary relationships among the species, clarifying patterns of phenotypic variation and establishing the genetic identity of endangered populations presently of concern for wildlife conservation authorities. Initial work in our study included an examination of malate dehydrogenase migration patterns in three species and several populations of Cicindela, to allow intraspecific as well as interspecific comparisons. It is hoped that gel acrylamide electrophoresis will improve resolution and elucidate some inconsistencies in Cicindela relationships.

K. Genetics and Cell Biology
Only Afternoon & Business Mtg. at 2:00 pm
SATURDAY, APRIL 27, 1991
Townshend Hall 250
Bonnie Lamvermeyer, Presiding

2:00 LOCALIZATION OF LORICRIN, A TERMINAL DIFFERENTIATION MARKER, IN A HUMAN SKIN EQUIVALENT IN VITRO.

M. Dana Harriger and Barbara E. Hull. Biological Sciences Department, Wright State University, Dayton, OH 45435.

The human skin equivalent (HSE), produced by layering a suspension of epidermal cells over a collagen-fibroblast matrix, is a convenient model to study epidermal differentiation in vitro. The bilayered HSEs were grown submerged in medium for one week followed by three weeks at an air-liquid interface. Loricrin, the terminal differentiation marker, is localized to the cytoplasmic surface of membrane envelopes in the stratum corneum of normal human skin. Paraffin sections of formalin-fixed HSEs were incubated with primary antibodies to loricrin (a gift from Dr. Dennis Roop) and localized using secondary antibodies conjugated to Texas Red. Linear fluorescence was observed in the upper stratum granulosum and throughout the stratum corneum of the HSEs. Cornified scales were isolated from HSEs, labeled with loricrin antibodies bridged with biotinylated IgG gold labelled antibodies, fixed in glutaraldehyde, and embedded for electron microscopic examination. Gold particles were appropriately localized on the cytoplasmic surface of the cell membranes. These findings suggest the HSEs cornify fully and serve as a good model to study the barrier function of human skin. Supported by NIH grant RO1-AR-39297.

2:15 HERITABLE MODIFICATION OF GENE EXPRESSION WITH TEMPERATURE CONDITIONS ADMINISTERED TO MAIZE SEEDLINGS TWO TO THREE WEEKS OLD

Bernard C. Mikula, Defiance College, Defiance, Ohio 43512

Maize seedlings grown at 22°C and 28°C in 1989 show heritable differences under conditions of paramutation where one allele is transactivated by another known to have a resident transposable element. The results are visible in testcrosses as a tassel mosaic for R-gene expression when gametes of a single plant are sampled each day. Gametes testcrossed each day from a single plant, over a seven day period, show gradients of expression. The different R-gene expressions isolated from the tassel mosaic of gametes are heritable. Four alleles show the same results in 1990 testcrosses. When seedlings are subjected to a wider temperature difference, 22°C and 31°C, the tassel mosaic becomes even more obvious. The data suggest that under the influence of transposable elements, genetic systems can undergo transgenerational programmable modification as a result of early environmental experience.

2:30 CHARACTERIZATION OF THE NOVEL GENE LOCUS, ALX, IN ESCHERICHIA COLI. Camille A. LaCroix and Joan L. Slonczewski. Biology Department, Kenyon College, Gambier, OH 43022.

The bacterium Escherichia coli can grow over a wide range of external pHs (pH 5 to 9), while maintaining a neutral internal pH. The rapid response to extracellular pH suggests that the bacterium have an internal pH regulatory mechanism. A novel alkaline-inducible gene was previously identified in E.coli (Bingham et al., 1990) by screening Mu dI1734 (lacZ, Km^R) operon fusions. The gene was mapped at 67.5 minutes by P1 transduction crosses, and the locus was designated alx. The focus of this project was to further characterize the alx gene, and determine more precisely its E.coli map location. A genomic library was constructed in Lambda EMBL3, which was screened for lacZ+ clones using X-gal indicator. Southern blots of agarose gels of single and double restriction digests of alx clone containing the Mu d::lacZ fusion were hybridized to a lacZ probe. An approximately 6 Kb EcoRI fragment containing alx was isolated. The EcoRI fragment will be used to probe known clones of the E.coli genome from 60 to 70 minutes.
In another experiment, ten secondary regulatory mutants of alx were isolated with MacConkey selective media. These regulatory mutants were found to be < 2% linked to the alx gene by Tn10::alx P1 transduction crosses. The alx regulatory mutants will be further mapped by P1 transduction and Hfr mapping.

K. Genetics and Cell Biology
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

Board L @ 9:00 GENETIC MAPPING OF A RIBOSOME EDITING MUTATION BY CLONING OF RIBOSOME PROTEIN GENES INTO pUC18. Jennifer B. McCormick and Rodney P. Anderson. Department of Biological Sciences, Ohio Northern University, Ada, OH 45810

In E. coli, a ribosome editing mutation causes a decrease in protein synthesis accuracy and an increase in the affinity of the ribosome for peptidyl-tRNA. Although the mutation has been mapped to one of five genes contained in the S10 ribosome protein operon the specific mutant ribosomal protein has not been identified. The purpose of this project was to clone fragments of the S10 operon into pUC18. If a recombinant pUC18 vector contained the wild type allele of the mutant gene, its introduction into the mutant strain would cause overproduction of the normal ribosomal protein and be expected to transform an editing mutant strain to a normal phenotype. Here we report the cloning of two fragments of the S10 operon into pUC18. DNA from EcoR1 and Kpnl digests of a low expression vector containing S10 operon genes has been ligated into pUC18 and transformed into JM105. Recombinant plasmid-containing transformants have been identified by screening for loss of lacZ complementation. Recombinant plasmids are currently being screened to determine insert size and orientation before testing for phenotypic suppression of the ribosome editing mutation.

Board M @ 9:00 MONOCLONAL ANTIBODY MT2 IDENTIFIES A DEVELOPMENTALLY REGULATED, EXTRACELLULAR MATRIX ANTIGEN FOUND IN THE REGENERATING LIMBS OF NEWTS AND AXOLOTLS.
K.P. Klatt*, E.V. Yang and R.A. Tassava, Dept. of Molecular Genetics, the Ohio State University, Columbus, OH 43210.

Monoclonal antibody MT2 reacts to an antigen present throughout the extracellular matrix of the blastema of regenerating limbs in both newts and Mexican axolotls. During regeneration, the MT2 antigen appears early in the pre-blastema phase, is most abundant during the blastema phase, and then disappears as digits are formed in the late regenerate. In unamputated limbs, the MT2 antigen is found in tendons, periosteum, perichondrium, and as a layer under the epidermis.

The MT2 antigen was extracted from the newt blastema using a diethylamine buffer, and further purified by immunoprecipitation. In Western blots under nonreducing conditions the MT2 antigen is a large polydisperse substance with a Mr of approximately 1200 kDa; under reducing conditions the MT2 antigen is seen as a major protein subunit (Mr 285 to 300 kDa) and at least two other subunits. One of the less abundant subunits (Mr 300 to 400) appears to be a chondroitin sulfate proteoglycan. Several lines of evidence show that MT2 is not tenascin, but is associated closely with tenascin in regenerating and unamputated limbs.

Supported by NIH grant HD22024 and ONR grant N00014-90J to R.A.T. K.P.K. is a visiting professor from the Dept. of Biology, Denison Univ., and E.V.Y. is a NIH Neuroscience Trainee.

Board N @ 9:00 RETROVIRAL REVERSE TRANSCRIPTASE: MEASUREMENT AND QUANTITATION.
L. Cioffi, E. Garber, W. Lapps, R. Smith and J.J. Kopchick. DNX, Athens, OH 45701, Merck & Company, Rahway NJ 07065, Molecular and Cellular Biology Program and Edison Animal Biotechnology Center, Ohio University, Athens, OH 45701.

An efficient retroviral reverse transcriptase assay was developed which is simple, quantitative, reproducible, and positively correlated to infectious virus titers. Chicken embryo fibroblasts were infected with the replication competent Rous Sarcoma Virus (RSV) and the culture fluids collected 5 days post infection. Titers of RSV in the culture fluid were determined by a focus assay and subsequently assayed for RT activity. Following the RT reaction, the assay cocktail was applied to a minifold slot blot apparatus to obtain uniform slots from each RT assay reaction. These discrete slots were exposed to X-ray film and the intensity of the slots determined by scanning densitometry. The results from the densitometry scan indicated that the RT assay is quantitative and can be used to detect low levels of secreted viral particles in culture medium ($<2 \times 10^4$ viral particles / ml). This technique can be used as an easy and inexpensive method to screen cell lines producing replication competent or replication defective retroviruses.

Board O @ 9:00 GRAPHICAL VISUALIZATION OF MOLECULAR BIOLOGICAL INFORMATION
C.D. Caraballo, 212 Findley Hall, Baldwin-Wallace College, Berea, OH 44017; R.J. Douthart, D. Thurman, LSL-II Mailstop F4-13, Battelle Pacific Northwest Laboratory, Richland, WA 99352

The significance of research to develop new analytical software programs has been emphasized since the beginning of the Human Genome Initiative. Work on the computer program Gnome View, developed at Battelle PNL, will be described. The Human Genome Project itself is a massive effort to map every base pair in the human genome. The project has many benefits including locating many morbid loci, increasing knowledge of gene interactions, and helping to speed up technology. The Human Genome Project is already producing large volumes of information. The information is being stored in many large databases such as Genbank, EMBL, and HGML. Computers are now needed to not only store the information but to analyze indexed data. Gnome View will be able to accomplish many of these tasks. The program will be able to query chromosomal, genetic, physical, and sequential maps. The query is designed to minimize the return of unnecessary data while also being fairly simple to use. Eventually a translator will connect the database manager of Gnome View to foreign databases. Until the funding is available, the data input into the local database will be used to test Gnome View's capabilities. After the translator is functioning, analytical functions similar to that of CAGE/GEM will allow scientists to have large amounts of information alongside their lab bench.

M. Psychology
Only Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 074
Robert Gandee, Presiding

9:00 ALTERNATIVE GRADING PROCEDURES FOR IMPROVING INSTRUCTION
Carole Newman, Ph.D., Bernard Esporite, Ph.D. and Isadore Newman, Ph.D.; University of Akron College of Education, Akron, Ohio 44325

This research is based upon the underlying assumption that good instructional procedures can be enhanced by testing and grading. These procedures tend to focus the instructor on the behaviors students are expected to demonstrate, and when used diagnostically, testing can provide valuable information to both the student and instructor.

Most test items are graded as either correct or incorrect, without taking into consideration that some incorrect responses may demonstrate varing degrees of knowledge on the part of the student. Therefore, all incorrect responses may not be equally wrong.

This study investigates the following: are there alternative methods for grading that will improve estimates of student knowledge; is there

a correlation between traditional grading approaches (responses right or wrong) and alternative procedures (partial credit); is there a relationship between alternative grading procedures and GPA; and are students who get feedback of the level of their general information knowledge more likely to seek correct information.

9:15 GIFTED AND AVERAGE STUDENTS: COMPARISONS OF ACADEMIC BEHAVIORS AND ATTITUDES IN DIFFERENT CLASS SETTINGS. Laura Boester & Aaron Roy Psychology Dept., Ashland University, Ashland, Ohio 44805

Many studies have measured gifted and average students' academic attitudes (e.g., self-esteem) when in classes with primarily gifted or average peers, but few have specifically studied students' academic behaviors (e.g., asking class questions and note taking) when in different class settings. Forty college freshman, divided into gifted and average groups on the basis of participation in high school gifted programs, were surveyed as to their high school academic behaviors and attitudes in both gifted classes (with many bright students) and non-gifted classes (with many average students). Twenty-eight questions were read to each subject by an interviewer and answers recorded using a Likert system. Gifted students showed significantly more desirable academic behaviors when in classes with peers than when with average students. Average students reported no differences in behaviors or attitudes when with average or gifted classmate. Comparisons between average students in gifted classes and gifted students in average classes showed the average students to have significantly better attitudes (but without improved behaviors). This difference resulted from academic attitudes that increased in the average students and decreased in the gifted students.

9:30 CHANGES IN INTENTION TO GET A DEGREE DURING THE FIRST QUARTER OF COLLEGE. Kate Heaphey, Robin Butler, and Sara Staats. The Ohio State University at Newark,Newark, OH 43055

While factors facilitating student retention have been actively researched, more than 50% of students who enter college still leave without receiving a degree (Astin, 1975; Tinto, 1987). The problem of attrition continues to grow and change in nature as it is addressed. Recent interest is turning to an investigation of cognitive and academic attitudes in contrast to earlier interest in social factors (Staats & Partlo, 1990). The present study looks at several aspects of one such cognitive variable, intent to get a degree, in a within-subjects design. Students were surveyed the first week of the quarter and the ninth week of the quarter. At quarter's end 66 of the initial 92 students completed the survey. In terms of test-retest reliability, "intent to get a degree in six years" was most reliable ($r = .82$, $p < .001$) and "intent to get a degree" was least reliable ($r = .31$, $p < .01$) but the latter measure was most closely related to total points at the end of the quarter. Total points at the quarter end was weakly related to several other intent measures, moderately related to expected grade in the course measured in the first week, and negatively related to satisfaction with life in general Results of an intervention will be discussed.

9:45 FORCES AFFECTING EDUCATIONAL REFORM IN THE U.S. Ralph F. Darr Jr. 301 Zook Hall, The University of Akron, Akron, Ohio 44325-4205.

Since the mid-1980s when President Reagan first called for reform of the U.S. educational system, many forces inside and outside the educational establishment have conducted studies and presented recommendations. While the Federal government has been reluctant to provide additional financial resources, various U.S. agencies have attempted to galvanize the states into action. Actual reform at the state level began in December 1982 when William Winter, Governor of Mississippi, signed House Bill 4. Neighboring states soon initiated similar omnibus educational reform acts. By 1987 most states had initiated some type of educational reform legislation. The 1986 National Governor's Conference made educational reform its primary concern. Seven task forces were created to study primary educational concerns and to develop a comprehensive plan of action. Local agencies also became involved in school reform. Other forces such as the Holmes group, the Carnegie Forum on Education and the Economy, and the various accrediting agencies have all offered recommendations for change. The number and types of recommendations are overwhelming. Among some of the more interesting and controversial proposals are the career ladder plans in Tennessee and North Carolina, the use of teaching effectiveness scales in Florida and Georgia, and subject-matter content testing in Georgia, Arkansas and Texas. With all these forces providing input, one wonders if orderly reform is possible and can be validly evaluated.

10:00 BURNOUT IN EDUCATIONAL ADMINISTRATORS AS IT RELATES TO COPING STRATEGIES: A SUGGESTION FOR INTERVENTION. William Sharp & Cynthia McMillin, The University of Akron, 410 Zook, Akron, Ohio 44325

Burnout is a syndrome of emotional exhaustion, depersonalization and reduced personal accomplishment that can occur among individuals who do "people work" of some kind. Researchers postulate that "burnout not only entails loss on several levels, but is itself in part a response to it" Price & Murphy, 1984, p.49.

To date the majority of burnout studies in education have focused on the classroom, special education and professional support staff. Studies are needed to focus on administrators, who not only supervise other educators but also provide direct service to students. Furthermore, worker burnout is a costly outcome; high worker turnover and low productivity. A strategy to lessen this phenomenon is needed. (Maslach) In their various situations, administrators must develop effective problem-solving attitudes and behaviors which help them respond to the difficulties arising from "people work."

Using the Maslach Burnout Inventory and Family Crisis Oriented Personal Evaluation Scales, the inventory will determine if there is a significant relationship and/or interrelationship between administrator's burnout and organizational/personal characteristics as they relate to coping strategies.

10:15 **UNIONIZATION AS A LEADERSHIP AND GOVERNANCE ISSUE IN HUMAN SERVICE ORGANIZATIONS. Robert Deitchman, Department of Social Work,U of Akron Akron, Ohio 44325-8001.**

The purpose of the following paper is to present an analysis of the role of unionization as a leadership and/or governance issue and its relationship to planning and management functions within the context of human service organizations. Current data will be reported discussing the impact of issues of leadership unionization and the life cycle of organizations. Several questions will be addressed: 1) what are the basic issues?; 2) why are they issues; 3) what scientific data is available to explain where they belong in the organization? 4) what impact are they having. Included in the discussion will be reports indicating that unionization has been a natural and accepted part of what is commonly called the world of business and should be a natural component of the non-profit corporate community.

10:30 INCREASES IN PERCEIVED CONTROL FOLLOWING TRAINING. Jaron Shook, Mary Lou Gambil, and Sara Staats, The Ohio State University at Newark, Newark, OH 43055

Persons with an internal locus of perceived control believe that what happens to them is to a large extent a result of their own actions (Rotter, 1966). Perceived control has been related positively to physical health, to emotional health, and to one's ability to cope with stress in a wide range of situations (Birren & Livingston, 1985). An increase in perceived control has been achieved in nursing home residents by giving them various responsibilities. However, few attempts have been made to increase the sense of personal control in non-institutionalized older persons through training programs. The present research employed a post-experimental measure of perceived control in 249 older persons who had participated in a mini-longitudinal study designed to increase hope and expected quality of life. In this study, persons were randomly assigned to a control group or to one of three experimental groups. The post-experimental measure of control indicated that those persons in a goal training group had a greater sense of perceived control than did those in the control group ($F\ 3,202 = 3.15$, $p < .05$). The practical implications are presented in the context of an increasing population of older individuals. Perceived control is presented in a theoretical context of expected, future efficacy.

10:45 MNEMONIC TRAINING EFFECTS ON OLDER ADULTS' RECALL FOR AN EVERYDAY TASK
Sandra Caramela-Miller, The University of Akron, Dept. of Psychology, Akron, Ohio 44325

This study demonstrates the effects of imagery through increasing the contextual support in order to optimize recall of younger and older adults. Recipes were used as the everyday task and served to house list-learning (ingredients) in meaningful context (prose reconstructive

memory). Participants were 36 older (range 61-89) and 36 younger (range 19-39) adults living in the community. All participants proceeded through each of the three recipe conditions (control, trained imagery, trained imagery plus enactive encoding) with the order of condition counterbalanced. Age group differences were found in list recall of the amounts of ingredients but not with the recall of the ingredients alone. Age groups performed similarly in reconstructive recall. During reconstructive recall there was a main effect of recipe condition and older adults produced more errors. Both age groups produced the same amount of errors during list recall of ingredients and there were no age differences found for errors during the recall of the entire recipe. Younger and older adults utilized equal amounts of study time with a main effect of recipe condition. At one month incidental follow-up, age differences were revealed with younger adults recalling more of the recipe than older adults, and a main effect of recipe condition was evident.

M. Psychology
Only Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 074
Ralph Darr, Presiding

2:00 A TWO-ITEM (RETROSPECTIVE) INDEX OF THE QUALITY OF HYPNOTIC EXPERIENCES. George W. Handley and Roger A. Page, The Ohio State University/Lima Campus, 4240 Campus Drive, Lima, Ohio 45804.

The 12-item Harvard Group Scale of Hypnotic Susceptibility (HGSHS) was administered to 273 undergraduates, followed by a 12-item Realness Rating Scale (RRS; a 5-point scale with zero indicating it was not like a real experience and 4 indicating it was almost exactly the same as a real experience), the 38-item Field Depth Inventory (FDI), and a 7-point Pleasantness Scale (PS) with one indicating the experience was very pleasant and 7 very unpleasant. Pearson correlations for the HGSHS with the FDI, PS, and RRS were .66, -.36, and .63, respectively, while the FDI/PS correlation was -.51. Analysis of individual items of the RRS revealed two items (arm and eye catalepsy) pooled produced a correlation with the HGSHS of .62! Since the correlation for for these catalepsy items and the PS was -.33 (similar to that of the HGSHS and PS), this suggests that both the HGSHS and the catalepsy items are tapping a "pleasantness" dimension to the same degree, which is to a lesser extent than that of the FDI. Although pleasantness does correlate with realness, evidence suggests that the two dimensions are not identical. If the nature of subjects' responding to how real the catalepsy items were does not change when the two are presented alone, the result is a 2-item index of the quality of hypnotic experiences that correlates well with hypnotic susceptibility.

2:15 THE EFFECTS OF GROUND REACTION FORCES IN AEROBIC DANCE. D.J. Turner, B.S., B.Hollering, Ph.D., and M.C. Verstraete, Ph.D., The University of Akron, Akron, Ohio, 44325.

The purpose of this study was to determine the effects of instruction on ground reaction forces (GRF) in females 18-25 years that were novice aerobic dancers. Data were collected in the Motion Analysis Laboratory with all the subjects performing six selected dance steps to a standard cadence established by a video. The first set of six steps (Trial 1) was performed without prior instruction. A second set of the same six steps (Trial 2) was performed following instruction and practice using a proper landing technique. Proper landing technique involves the subject landing on the forefoot and coming down on the heels while flexing the knees immediately. GRF data were collected using an AMTI force platform at 500 samples per second for each of the dance steps in Trials 1 and 2. Peak vertical GRF were determined for each step in Trials 1 and 2. Lower GRF were noted in Trial 2. The growth of aerobic dance has been accompanied by an increase in dance injuries. Injury appears to be related to the design and conduct of the program. The implication of this study would support that proper landing instruction during dance routines may minimize the risk of injury.

2:30 A META ANALYSIS OF GENDER DIFFERENCES IN PAY IMPORTANCE. Jacqueline M. Szmania & Robin Butler. The Ohio State University at Newark, Newark, Ohio 43055.

One body of research indicates that gender influences expectations with regard to work (Manhardt, 1972; Schuler, 1975; Subich, Cooper, Barrett, and Arthur, 1986). Generally these findings indicate that males tend to assign greater importance than females do to pay. However, the findings in this area are not entirely consistent. Studies have found no important sex differences in work-related values (Brief and Aldag, 1975; Brief and Oliver, 1976). The research which has explored the issue of gender differences in pay importance is conflicting.

Research in this area was combined by meta-analysis to determine the effect of gender on pay importance. Meta-analysis is used to integrate the literature in a quantitative fashion, as opposed to a qualitative fashion. It is an efficient way to summarize large literatures and offers a more objective review than traditional qualitative reviews (Green and Hall, 1984).

Results from the meta analysis indicate that there is not a significant relationship between gender and pay importance. A chi-square test for homogeneity revealed wide variation in the correlation across studies. This suggests that the samples come from more than one population. A search for possible moderators was conducted.

2:45 A CLOSER EXAMINATION OF GENDER DIFFERENCES IN DATING ACCURACY. John J. Skowronski, Laura Shannon, Andrew L. Betz, and Charles P. Thompson. The Ohio State University at Newark, Newark OH, 43055.

Several previous studies in our research program have obtained evidence suggesting that females are more accurate retrospective daters of personal events than males. Data from a recent diary study was used to more precisely determine the reasons underlying this superiority. These data suggest that the effect is likely due to memory processes, not to judgment or estimation processes. That is, when the event dates provided by subjects were inaccurate, both males and females were equally inaccurate. However, females more frequently provided exactly correct date estimates than males. The results of a content analysis suggested that this female superiority persisted across event content domains, although there were a few possible areas of male dating superiority.

3:00 RELATIONSHIP BETWEEN A 12-STEP RECOVERY PROGRAM AND LOCUS OF CONTROL, SELF-CONCEPT, COPING STYLE, AND BINGE FREQUENCY IN COMPULSIVE EATING WOMEN. Cindy Boone-Hawkins, 82 Corson Ave., Akron, Ohio 44302.

The purpose of this study was to examine the potential effectiveness of a 12-step program for a group of compulsive eating women and to examine the relationship between the program's effectiveness and locus of control, self-concept, and coping style of subjects. The present study includes 100 subjects selected by advertising for female volunteers to participate in research on compulsive eaters. Fifty subjects are currently members of the 12-step program for compulsive eaters. The remaining 50 subjects are students from the University of Akron. The student group are all female and serve as a comparison group. The comparison group meets the qualifications for the 12-step program, but none are members. It is hypothecized that the group of compulsive eating women in a 12-step recovery program will have significantly more internal locus of control, higher self-concept, and more functional coping styles than the comparison group. It is also hypothecized that women in the 12-step program will show significantly lower frequency of binge eating behavior than the comparison group.

3:15 THE RELATIONSHIP BETWEEN PARENTAL ALCOHOLISM AND PERSONALITY TRAITS, LOCUS OF CONTROL, AND SELF-CONCEPT IN ADULT CHILDREN OF ALCOHOLICS. Kathryn L. Butcher, 13793 Copp Ave., Hartville, Ohio 44632, and Cindy Boone-Hawkins.

Adult children of alcoholics are a population of individuals which have been recognized as potentially being at risk for alcohol or other substance abuse, and as such could benefit from early identification and intervention. Research also suggests that this population will tend to treat its children in ways which often result in the perpetuation of a cycle of substance abuse and/or other maladaptive behaviors. The purpose of this study was to evaluate a sample of adult children of alcoholics

in order to determine whether their profile differed from the norm, as defined by the California Personality Inventory, Rotter's Internal-External Locus of Control Scale, and Rosenburg's Self-Concept Scale. A general hypothesis was that there would be a significant difference between the scores of the adult children of alcoholics on the above instruments and those of the normative groups. It was also hypothesized that there would be not one, but multiple personality types which would be identifiable in this sample. It was expected that this information would generate additional research on ways to improve early identification and intervention for this population.

3:30 **THE IMPACT OF QUESTION ORDER ON RESPONSES TO PERSONALITY TRAIT QUESTIONS.** John J. Skowronski, W. Richard Walker, Thomas M. Ostrom & Andrew L. Betz. The Ohio State University at Newark, Newark OH, 43055.

Two studies were conducted in which subjects first read an ambiguously hostile paragraph about a social target, then made trait judgments about that target. The order of the trait judgments that subjects were asked to make was varied. One group of subjects received the items in a randomly-generated order; a second group of subjects received the questions in a blocked order in which the hostile-related items (hostile, dislikable, unfriendly) and the anti-hostile-related items (kind, considerate, thoughtful) were separately clustered at the beginning and at the end of the questionnaire; a third group of subjects received the items in a blocked order in which the hostile-related items were clustered with other evaluatively similar, but non-hostile items (selfish, boring, narrow-minded; dependable, intelligent, interesting). Factor analytic results suggest that question clustering affected the social categories used by subjects to answer the trait questions. Results are discussed in terms of their implications for models of social category structure and use when personality trait judgments are made.

3:45 PERSONAL AGE, SELF-REPORTED HEALTH, AND OTHER MYSTERIES. Kathy Stubbs, Christie Partlo, and Sara Staats. The Ohio State University at Newark, Newark, OH 43055.

Because chronological age is an imperfect predictor of human behavior, personal age, or how old a person seems to himself, has been proposed as part of an alternative concept, functional age. A measurement of personal age, the Ages of Me Scale, has yielded data indicating that how old one looks and how old one feels are two fairly distinct components (Kastenbaum, Verbin, Sabatini, & Artt, 1972). The present research explores other correlates of personal age and self-reported physical health in a group of 249 non-institutionalized persons over 50 years of age. Chronological age was weakly related to all measures of personal age ($r \leq .15$). How old one feels was the only item on the Ages of Me Scale that correlated significantly with all four measures of self-reported health. Mood, major life changes, daily uplifts and daily hassles yielded small or insignificant correlations with personal age and self-reported health for the total group. Secondary analyses on groups high or low in self-reported health indicated that age and sex were highly correlated with personal age for persons with poor health and were unrelated for persons with good health. Implications for measures of functional age are discussed.

N. Junior Academy
First Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 038
Amy Elfner, Presiding

9:00 ADDITIONAL ANALYSIS OF THE EFFECTS OF DIFFERENT CULTURE MEDIA ON THE GROWTH OF A LICHEN SYNTHESIZED FROM SEPARATE ALGAL AND FUNGAL SYMBIONTS. Amy M. Elfner. 29 Darlington Road. Delaware, OH 43015.

Growth trials have been conducted using a commercially available alga, Trebouxia ericia, and fungus isolated from the native Ohio species of lichen, Cladonia cristatella, collected in Delaware County. The objective of this **project was to determine which culture media would produce the most effective growth of a lichen species. The hypothesis was that when the alga and fungus were combined they would grow together as symbionts most effectively on agar with no aiding nutrients. Analysis was conducted using a compound light microscope with results recorded by color and black and white photographs. Results from repeated growth trials show that the fungal hyphae were closer together to the algal cells on pure agar than on agar aided by corn syrup. Thus the hypothesis was supported.**

9:15 HERBICIDE TOXICITY
Margie Lhamon, 1126 State St., Lima, OH 45805

This research tested the toxic effects of two herbicides, RoundUp and KleenUp. Experiments were conducted on three different organisms.
An avian teratological experiment was conducted by injecting different concentrations of the herbicides into H&N Leghorn chicken eggs. The eggs were opened after 15 days of incubation. RoundUp caused an increase in fetus resorbtion and deformities, such as missing eyes and crossed-beaks. Deformities were not noticable with KleenUp.
A microbiological experiment was conducted to determine the zones of inhibition around 6.9mm filter paper disks saturated with the two herbicides. The average zone of inhibition for E. coli treated with KleenUp was 7.18mm and 10.44mm for RoundUp. The average zone of inhibition for Saccharomyces cerevisiae treated with KleenUp was 7.28mm and 10.61mm for RoundUp.
An EC:50 experiment was conducted on Artemia salina. KleenUp was more toxic on the Artemia salina than RoundUp. The toxicity level data sheets provided by Monsanto were in close agreement with my experimental results. The EC:50 for KleenUp at 40 hours was with a 3.2% solution.

9:30 THE EFFECTS OF THE AZIDE ION ON THE STRUCTURAL INTEGRITY OF CHLOROPHYLL A. Mark Wilson, 1087 Asbury Rd., Cincinnati, OH, 45255.

This research was designed to investigate the biochemical mechanism behind inhibition of photosynthesis by the azide ion. The hypothesis was that azide would chemically alter the structure of the pyrrole ring of chlorophyll A and thus interfere with the promotion of an electron during the light phase of photosynthesis. Chlorophyll A was isolated from the other breakdown products of the chloroplast by using petroleum ether as a nonpolar solvent that put chlorophyll A into solution, while a 95% solution of methanol in water, being slightly more polar than petroleum ether, put chlorophyll B, carotene and xanthophyll into solution. The resulting ether solution of chlorophyll A was then evaporated and the solid divided into three tubes and exposed to .5 and .05 molar concentrations of sodium azide and a control tube, respectively. These solutions, in a 97% acetone-water solution, were allowed to sit for three days, after which the chlorophyll A was extracted due to its higher solubility in petroleum ether than acetone and the resulting solution, now devoid of free azide ions, was evaporated and the resulting solid samples run through an infrared spectrophotometer. The characteristic azide peak was detected, but the samples still showed chlorophyll's characteristic red fluorescence, suggesting that the phytol ester and not the pyrrole ring of the chlorophyll was affected.

10:00 The Invention for Preparing Microscope Blood Slides by Andrea Robin Durrant; 4228 Clay St.; Geneva, Ohio 44041

I have spent three years in research and development in creating a portable device that is faster and more efficient supplementary method than any other provided techniques of producing blood smears today. Examination of a smear of peripheral blood is one of the most informative and routinely examined laboratory procedure carried out day after day, in both veterinary clinics and medical hospitals. Such tests are used microscopically to analyze the morphology of the cellular elements contained within the blood itself. Therfore, acceptable blood smears are essential, for no degree of skill, or diagnostic ability can interpret, or compensate for poorly made smears. The preparation methods available today are insufficient. Therefore, what I have done is created two devices, one manual, and the other automatic which both produce perfect blood smears every time, thus ending the frustrating, time consuming, and costly dilemma of today's practitioners.

10:15 TO BE OR NOT TO BE MCF-7, PHASE III: A NEW APPLICATION OF THE POLYMERASE CHAIN REACTION TO DETECT GENETIC INCONFORMITIES IN SEVERAL CULTURES OF MCF-7 BREAST CARCINOMA CELLS. Ilea A. Mathis, 6491 Tassel Court, Westerville, Ohio 43081

This project's subject is the MCF-7 breast carcinoma cell line, initiated in 1973 by a research team at the Michigan Cancer Foundation with the support of the National Cancer Institute. The cell line has been used in hundreds of published and unpublished experiments around the world. Since then several cultures of MCF-7 have been obtained from commercial sources by The Ohio State University's Department of Pathology. Each culture, after seventeen years of generation, has expressed one or more of the following differences: (a) morphology, (b) growth characteristics, (c) hormone receptivity, and (d) antibiotic resistance to adriamycin. In this project the four cultures were analyzed to determine their origin and genetic profile. To determine origin, isozyme analysis was used. To determine the genetic profile of each culture, DNA "fingerprinting" analysis, a viable method of identification and comparison, was used. To confirm controversial results received from the second phase of this experiment, the polymerase chain reaction was used to indicate whether or not two of the cultures were, indeed, contaminated with another cell line. This a new experimental design and use for the PCR, and the implications of this research are highly significant.

10:30 **CLONING AND MEASURING OF ACTIVITY OF BACTERIAL PROMOTERS OF B. SUBTILIS AND E. COLI.** Aaron S. Reames. 546 S. Madriver, Bellefontaine, Ohio 43311.

At the present time, biotechnology and genetic engineering are having a tremendous impact on society. One of the products being developed from this technology is plasmids containing specific genes encoding the production of specific proteins. In front of these genes are promoters controlling the amount of production that will occur. Promoters that allow for more rapid production of proteins could be a useful technological tool.

Band, Yansura, and Henner at Genentech created two plasmids (pCPP-3 and pCPP-4) which lack a promoter for a chloramphenicol acetyl trnasferase (CAT) gene. In front of the ribosome binding site of the CAT gene, they created EcoRI or BamHI sites for DNA fragment insertion. Following the CAT gene is a λ^{t}_{0} terminator sequence for the facilitation of strong promoter isolation.

Chromosomal DNA of E. coli and B. subtilis was cut by the enzyme corresponding to the specific enzyme site on the plasmid to be used. The DNA fragments were inserted into the plasmid using a T4 ligase and the activity level was detected by plating the cells which were transformed with the plasmids carrying the insert onto media containing different levels of antibiotics.

The highest level of activity was demonstrated in cells which carried pCPP-3 with fragments form B. subtilis.

N. Junior Academy
Second Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 043
Heather VanBuskirk, Presiding

9:00 MAMMAL BLOOD SERUM EVALUATION: GEL CHROMATOGRAPHY AND CELLULOSE ACETATE ELECTROPHORESIS. Amy Jo Roy. 817 Edgehill Ave. Ashland, Ohio 44805

Baboon, cat, cow, dog, hog, and rat sera were passed through a gel chromatography column to see if the proteins would separate into bands. A 6.86 pH buffer was combined with Sephadex G-50 (medium) powder to form the gel used in the column. Each sample, which was combined with ninhydrin crystals, was run for approximately 35 minutes at six drops per min. Cellulose acetate electrophoresis, utilizing Sepraphore III (cellulose polyacetic) strips, was used to detect the proteins in the sera filtered from the chromatography column. An 8.8 pH buffer was used in the cathode chamber. Test runs lasted 40 to 80 mins. and then the Sepraphore III strips were placed in a Ponceau S dye solution and three baths of acetic acid. In the chromatography column there were no individual bands of separated serum, only one continuous streak. During electrophoresis with sera that had been passed through the chromatography column, no bands were visible on the cellulose polyacetic strips, but when unfiltered serum was used at least two definite bands of separated proteins were seen.

9:15 SEROLOGIC EVIDENCE OF CRYPTOSPORIDIUM SPP. IN CAPRINE SPP. BY INDIRECT IMMUNOFLUORESCENCE Rebecca A. Spore, 1332 Carriage Hill Court, Ashland, Ohio 44805

Protozoan parasites of the genus Cryptosporium cause a short-term gastroenteritis in several species. In Ashland County, Ohio, there have been recent out-breaks of Cryptosporidiosis in the goat population. Although Cryptosporidium spp. was first discovered in goats by Mason, Hartley and Tilt (1978) using fecal smears, detection by serologic methods still had not been cited. This study evaluates an indirect immunofluorescence test for the detection of antibodies specific to Cryptosporidium spp. It also demonstrates the presence of antibodies to Cryptosporidium spp. in different age groups in goat herds.

9:30 PRODUCTION OF THE BACILLUS THURINGIENSIS DELTA-ENDOTOXIN IN SACCHAROMYCES CEREVISIAE Heather Van Buskirk Benjamin Logan High School 6609 St. Rt. 47 E. Bellefontaine, OH 43311

Bacillus thuringiensis is a bacterium that produces an insecticidal crystal protein during sporulation. This crystal, the delta-endotoxin, is toxic to many species of Lepidoptera which are serious crop pests. B. thuringiensis is an aerobe and does not grow well in oxygen depleted conditions. The yeast species Saccharomyces cerevisiae can function either as an aerobe or as an anaerobe. For this reason it is thought that this yeast, in fermentation processes, may produce a greater amount of the delta-endotoxin than the bacteria.

This paper deals with the construction of a plasmid which contains both a sequence encoding for the delta-endotoxin and a sequence allowing replication in yeast. Attempts to transform E. coli with this plasmid were unsuccessful, and it was concluded that the E. coli origin of replication was being interfered with during digestion of the vector. To avoid this problem, the plasmid will be transformed directly into S. cerevisiae. Presence of the plasmid will be confirmed using a non-radioactive DNA probe, and bioassays and ELISAs will be used to determine whether or not the yeast will produce a greater amount of the delta-endotoxin than the bacteria. If greater production is obtained in the yeast, the transformed yeast strain will be made available for research as a potential pest control agent.

10:00 HABITUATION AND DISHABITUATION IN DROSOPHILA MELANOGASTER USING OLFACTORY STIMULI; Joann Elizabeth Roy, 3212 Stonewood Dr., Sandusky, OH 44870

This research has established a new assay of habituation and dishabituation in wild-type Drosophila melanogaster and its memory mutants, dunce and amnesiac, and corroborates current theory associating memory with the cAMP cascade. The jump response in naive flies to a three second vapor exposure of 10% benzaldehyde dissolved in paraffin oil was considered habituated when flies reached a trials-to-criterion (TTC) of seven out of seven no jump responses. Two minutes after the last olfactory cue, control flies received another three second odorant exposure to test spontaneous recovery of the jump response. Thirty seconds following the last cue, experimental flies were vortexed (the test tube holding the fly was spun axially at a high r.p.m. to disorient the fly) for fifteen seconds. Seventy-five seconds after vortexing, these flies received another benzaldehyde exposure to test dishabituation of the jump response resulting from vortexing.

Wild-type flies exhibited expected levels of dishabituation and no spontaneous recovery -- suggesting that these flies' neurons did habituate. Dunce flies exhibited reduced levels of dishabituation and slightly elevated levels of spontaneous recovery. Amnesiac flies displayed high levels of dishabituation and spontaneous recovery. These data suggest that the phenomena of response increment and decrement result from neuronal fatigue and habituation.

10:15 COLORIMETRIC DETECTION OF SINGLET OXYGEN Gargi Narain, 2828 Hinde Avenue, Sandusky, Ohio, 44870.

Singlet oxygen is a short-lived but important intermediate in a large number of chemical reactions of biological, medical, commercial and environmental significance. The objective of this research was to detect this short-lived intermediate using inexpensive and simple equipment available in high schools and undergraduate colleges. It

was hypothesized that phenols that often form colored quinones can be converted into colored compounds by reacting with singlet oxygen. Therefore various phenols were used as substrates and were oxidized using Rose Bengal as the sensitizer. Singlet oxygen oxidations were performed with a separated surface sensitizer. The hypothesis was confirmed for 2,7-napthalenediol. Kinetics analysis indicated that color formation was directly proportional to illumination time up to 30 minutes, indicating that this change is a reliable and straightforward way to estimate the amount of singlet oxygen formed. The gas phase lifetime of the agent responsible for the color change in 2,7-napthalenediol was determined by a distance dependence analysis agreement of the observed lifetime with that expected for singlet oxygen. Under these conditions it was confirmed that singlet oxygen is the agent responsible for the change in color in 2,7-napthalenediol.

10:30 GRAPHOANALYSIS: A 2 YEAR STUDY IN HANDWRITING
Kimberly A. Ellis. 1081 East Garfield Road. Aurora, Ohio 44202-9733

Graphoanalysis is the scientific study of analyzing one's handwriting in order to gain a better insight of this person and their true identity. The purpose of this project is to determine the practicality of graphoanalysis in our society through the use of adolescents (18 and under til 13) and adults (21-34 and 35-80). Research included using 60 adolescents and 60 adults. The results indicated that a common level of accuracy within 5 percent of the other. From these results I have concluded that using graphoanalysis as an indicator of one's true identity is practicle in our society, especially in the work place as an indicator of an employees' true attitude and compatability with other employees. It is also very useful in the court system as an indicator of the attitude of a client.

N. Junior Academy
Only Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 038
Ilea Mathis, Presiding

2:00 THE RISING CASPIAN SEA: OBSERVATIONS DURING A 1990 EARTHWATCH EXPEDITION. David M. Weaner, Westerville North HS, 950 County Line Road, Westerville, OH 43081.

The objective of this project was to document coastal geomorphic and sedimentologic response to rapid rates of sea-level rise on the Caspian Sea in order to better define corrective and mitigating action on the part of society should sea-level rise accelerate on a global scale. During the first field season, August 12-Sept. 5, 1990, the team conducted a reconnaissance survey of three north and west basin islands in the Caspian Sea to evaluate the current geomorphic, sedimentologic, and shallow stratigraphic framework. This involved two principal efforts: establishing an initial survey grid and reference system, tied into the local leveling datum (benchmarks) for return surveys in future years; and classifying the 1990 coastal sedimentary environments through sampling, aerial reconnaissance, shallow coring, and geomorphic analysis. Surveying entailed three groups, two onshore groups conducting transect surveys across the salient coastal environments to the open coast, and an offshore group with a fathometer onboard a shallow craft extending the survey transects to water depths of between 5m to 10m. The onshore party completed as many parallel transects as possible each day, all the while sampling the surficial sediments and classifying environments. Various levels of equipment intensive activities were possible, including gouge auger coring of littoral environments, subbottom acoustic profiling of offshore regions, and water column sampling for suspended sediment. Funded in part by a grant from TRW, Inc.

3:45 **CAN A TURTLE BECOME A BIRD? EXTENDING LOGO'S 2D TURTLE GRAPHICS TO A 3D BIRD GRAPHICS SYSTEM.** **Jonobie Dale Baker, 5525 Allyn Road, Mantua, OH 44255.**

The programming language LOGO provides two-dimensional turtle graphics enabling a user to move a turtle in the plane and see the path of the turtle projected on a computer monitor. This work extends the turtle graphics of LOGO to three dimensions by allowing a user to move a bird in space and project an image of its flight from any observation point onto the monitor. The system is programmed in Apple IIc LOGO and uses mathematical computations to move the bird and provide a one point projection of the bird's flight path as seen from any observation point onto a monitor. The system can be used effectively as an interactive tool for learning three-dimensional geometry and spatial motion. Earlier work by H. Reggini at M.I.T. approaches the extension in a different manner and fails to adhere to the LOGO philosophy in the commands and user interface as this project does.

4:00 ATOMIC SPECTRA ϕ II: MEASUREMENT OF THE ELECTRON SPIN-ORBIT INTERACTION IN SODIUM. JEREMY R. RIDDELL, 3254 Ferry Rd, Bellbrook, OH 45305

When an excited outer electron in an alkali atom makes a transition from a higher to a lower energy level, the emitted photon energy is determined by the orbital change and whether or not the electron changes spin orientation. This creates what is known as spin-orbit coupling of the electron's orbital angular momentum, l, and the electron spin vector, s. In Sodium, two closely spaced lines are observed that have similar energies, called Doublet Fine Structure. A home-built grating spectrometer equipped with a special micrometer was used to measure wavelength and wavelength difference of six Sodium doublets. Micrometer values were converted into wavelength by calibrating the spectrometer with Hg and Ne sources. The delta wavelengths of these doublets were then converted into wave numbers and compared with the theoretical separation according to the doublet separation equation:

$$\Delta\nu = \frac{R\alpha^2(Z-S_0)^2(Z-S_1)^2}{n_0^3\, l(l+1)} \text{ cm}^{-1}$$

An average $\Delta\nu$ of 16.8 cm^{-1} was measured, while the actual value is 17.17 cm^{-1}, with an average error of 2.2%.

4:15 Using Solar Cells to Recycle Energy
Stanley Dickerson, Box 93, Scio, Ohio 43988

The purpose of my project was to show that energy can be recycled by using solar cells. To do this I took six semi-crystalline solar cells and placed them around a light in a hexagon shape. Then I wired them into a circuit with alead-acid battery so that the solar cells would charge the battery. To power the light I used another lead-acid battery. Once this battery was no longer able to provide power to the light, I then switched power to the battery that was being charged by the solar cells. I covered the solar cells and light bulb with a light-tight box so that the solar cells would only be exposed to the light from the lightbulb.

To record the information from my experiment I used a computer. I designed and wrote a computer program that would keep track of all voltages and amperages. This program also had an alarm which signalled that the light had gone out.

I was able toshow that it is possible to recycle energy with the use of solar cells. My experiment showed an increase in the voltage of the lead-acid battery charged by the solar cells. This increase averaged three millivolts. This method of recycling has an efficiency of abot one percent. With the devolpment of new mateials it may be possible for the efficiency to increase.

4:30 GRAVITY AND KEPLER'S SECOND LAW. Jared R. Kern 3274 US 68 South, Xenia, OH 45385

Kepler's second law states that, "The radius vector joining each planet with the Sun describes equal area in equal times." I hypothesized that if the Sun's gravitational pull on the planets were somehow canceled, so that the planets no longer followed elliptical orbits, that this law would still hold true. Using several scientific facts, and a geometric proof, I was able to prove my hypothesis correct.

4:45 The Relationship of Height on the Ability to View a Holographic Image, Gregory Dante Roulette, 2966 Warrensville Ctr. Rd., Shaker Heights OH 44122

The effect of standing and sitting height on the ability to view a holographic image set at different angles was tested. It is hypothesized that height standing and sitting will show a significant correlation between the angle at which the hologram is viewed. A test box which contained holograms mounted at 30°,130°,and 180° in relation to the fluorescent light was designed and built. 106 students from Shaker Heights High School were randomly selected for the test. The test box was placed 57.5cm from the floor. The height of each subject standing and sitting was measured from floor to eyes. The subject and chair were placed 160cm from the test box. The results showed the average heights of subjects viewing the hologram 130°- 177cm, 180°- 164.7. The average sitting heights viewing the hologram at 30°- 125cm, 130°- 120cm, 180°- 126cm. The following correlation can be concluded: The taller you are the more obtuse the angle at which the hologram must be mounted. The shorter you are the more acute the angle at which the hologram must be mounted. This information is significant because it proves height must be considered when designing a holographic product.

N. Junior Academy
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

Board A @ 2:30 — ORAL TELESCOPING MOUTH-STICK. Mitch Hager. 2230 Cambridge Blvd. Columbus, Ohio, 43221

This project deals with the modification of a telescopic device invented by Arthur J. Cloran D.D.S. The device was created to help quadriplegics draw, write, type, and do many other things that they could not do otherwise without the telescopic device. The mouth -stick has a mouth-piece attached to a motor which can extend or retract by using one's tongue to flip a switch. However, this mouth -stick was created over twenty years ago, and contained heavy, expensive materials that were considered very light and strong for the times. The appearance and weight caused many quadriplegics to be turned away from purchasing the mouth-stick. But in this age of light and strong materials such as graphite and titanium, the somewhat heavy adjustable mouth-stick can be redesigned to become lighter. Mouth-piece design, stick materials, construction, microswitch design, and actual implementation will be included in the project. With the use of modern technology the mouth-stick can become the most usable device for the quadriplegics. The goal and purpose of this project is to design the lightest and easiest mouth -stick to use by all quadriplegics at an economical price. A lighter mouth-stick will enable the quadriplegic to use the invention with relative ease, making it more useful in everyday life.

Board B @ 2:30 — VIDEO MANIACS. Joshua Scott Emmons, 2035 Buena Vista Dr., Coshocton, Ohio 43812

The question has been raised of possible harmful effects due to the long number of hours kids spend playing video games. I investigated three areas: eyestrain, stress, and reaction time. My research, which involved the playing of video games by individual subjects for a period of three hours, showed no increase in stress; no evidence of eyestrain in nine out eleven subjects, (when playing under proper lighting conditions); and an improved reaction time in the majority of the subjects.

Board C @ 2:30 — **ARE CIGARETTE FILTERS REALLY EFFECTIVE?** Shannon Pearson, 8633 W. State Route 163, Oak Harbor, Ohio 43449.

The purpose of this project is to determine the effect of cigarette filters in eliminating nicotine, tar and other harmful substances from entering the body. A clean cotton ball was pushed into the end of a syringe with clear tubing attached, and the narrow end of a baster was snapped into the syringe. A lit cigarette was placed into the opposite end of the clear tubing. The smoking process was simulated by squeezing the baster (lungs) and repeatedly bringing the lit cigarette to the tubing until the cigarette was smoked. Like the cotton balls from the cigarettes with the filters removed, the cotton balls from the filtered cigarettes were also stained. This experiment proves that filters do not stop the harmful substances from entering the body because all cotton balls were stained.

Board D @ 2:30 — EYE ACCESSING CUES, Elisa Celio, 726 Glacier Heights, Youngstown, Ohio 44509

I did research in the field of Neurolinguistic Programming. My interest centered on a behavior known as Eye Accessing Cues. The theory behind Eye Accessing Cues is that one accesses different parts of the brain with certain, specific eye movements. My intent was to prove or disprove this theory.

To do this, I created a questionnaire designed to force the subject to use six specific brain functions; visual remembered images, visual constructed images, auditory remembered, auditory constructed, auditory dialogue and kinesthetics. I interviewed the subjects from this questionnaire. While asking, I observed and recorded the eye movements of the subjects. After the interview, I compared these observed eye movements to the eye movements as predicted by the theory of Eye Accessing Cues.

I compiled the data and tabulated the correctly predicted eye movements according to the Eye Accessing Cue theory. To interpret these results, I assumed that there would be a 1:6 (17%) chance that the eyes would be in any one of the six cue positions I studied. Anything over 17% would point to some validity in the Eye Accessing Cue theory. Overall, I was correct in predicting eye movements 45.1% of the time. The breakdown for each specific brain function was: visual remembered - 66.6%, visual constructed - 58.8%, auditory remembered - 62.7%, auditory constructed - 29.4%, auditory dialogue - 35.3%, kinesthetics - 17.6%. My research proved that there is validity to the Eye Accessing Cue theory.

Board E @ 2:30 — DOES A SURFACTANT CHANGE THE RATE OF REACTION BETWEEN HCl AND Mg? Andrew R. Young 308 Cedar Brook Lane, Sandusky, Ohio 44870

Chemical reaction rates are ordinarily governed by four common factors: reactant concentration, environmental temperature, pressure, and surface area of reactants. PURPOSE: To determine whether a fifth factor, presence of a surfactant, alters reaction rates. MATERIAL AND METHODS: In the presence of anionic surfactant lauryl sulfate 0.01 g, a 2 cm surface area strip of Mg was immersed in 150 ml 0.75 M HCl. Hydrogen was collected in a eudiometer and timed. Five determinations were made; another five without surfactant served as controls. RESULTS: Virtually identical volumes of hydrogen were produced with and without lauryl sulfate. Reaction time increased by 25 minutes in the presence of lauryl sulfate, which created a large bubble barrier surrounding the Mg. CONCLUSION: Surfactant, a fifth factor, greatly influences (slows) reaction time in this experiment.

Board F @ 2:30 — THE EFFECTS OF SMOKING ON THE CIRCULATORY SYSTEM. Mary K. Dennemann, 6803 Sunray Ave., Cincinnati, Ohio 45230

In this experiment I charted and tried to understand the effects of smoking on the circulatory system. To do this I ran tests on my father for one week while he was still actively smoking. On the eighth day he quit smoking and I ran the same tests for another week.

These tests included taking his resting heart rate and blood pressure, then having him run in place for two minutes. Immediately after, I ran the same tests until the results were back to normal. Once I had finished this I compiled all of my information into graphs to show what I had done.

Board G @ 2:30 — EFFECTS OF SOLID WASTE ON PLANTS USING MODEL LANDFILLS. Emilie Schmidt. 771 Wards Corner Rd., Loveland, Ohio 45140.

This project shows the effect certain kinds of solid waste (trash) can have on plants. I created mini landfills to show this. I used 5 2-liter plastic bottles with bottoms cut off,placed upside down in a stand. Each was layered with dirt and rock and each had a philodendron plant in a cup placed under it. Table food (scraps of beef, lettuce, vegetables ground up) was placed in one landfill model. Two tablespoons of tri-sodium phosphate was added to a second, 1/4 cup motor oil was added to a third, battery acid from 2 D-cell batteries was added to a fourth and the fifth had nothing added. Each had one cup tap water added every week.

My hypothesis: soil with tap water only added and soil with table scrap food added would not affect the plant under it.

Soil with tri-sodium phosphate, motor oil and battery acid would be affected. The results confirmed the hypothesis. Plants under the model landfill containing table scrap food or water only were not affected. Plants under model landfills containing battery acid, motor oil and tri-sodium phosphate died in the order listed.

The project shows that some kinds of trash we throw out can be harmful to our environment. Many people throw out containers with residue of chemicals I placed in the model landfills. This trash is placed in landfills and could be harming our air, soil and water. This suggests we must find safer ways to dispose of trash, including recycling.

Board H @ 2:30 TESTING THE EFFECTIVENESS OF COMMON BAR SOAPS AS COMPARED WITH A PRETESTED LIQUID HAND SOAP

Reid Perala - 600 Eastwood St., Geneva, Ohio 44041

I tested five commonly used bar soaps and one pretested liquid soap to determine their effectiveness as antimicrobial agents by culturing bacteria collected from my hands in petri dishes before and after washing with each test soap and comparing the amount and type of bacteria that grew.

I also cultured bacteria from each test soap to determine whether the soaps themselves were harboring bacteria.

The procedure used included sterilization, contamination, inoculation, disinfection, reinoculation and incubation using strict controls.

I concluded that washing with any soap reduces the amount of bacterial growth on the skin's surface, however soaps containing bacteriostats are most effective.

Each of the bar soaps showed decreasing effectiveness in removal of bacteria in each successive trial while the effectiveness of the liquid soap remained constant. I concluded that this decrease in effectiveness was due in all probability to contamination of the bars with bacteria during normal use. My research showed that the use of bar soaps is not only an ineffective method for disinfection of skin surfaces, but also washing with in-use bars may actually contaminate skin surfaces with microrganisms deposited on the bars during previous hand washings.

Board I @ 2:30 **"ARE YOU THINKING RIGHT?"** Susan E. Collins, Route 1, Box 189B, Malta, Ohio 43758

To prove my hypothesis that "creative" people use the right hemisphere of their brains more, I did three experiments to establish which side of the brain the subjects were using and had each subject answer a questionnaire reflecting their occupations, hobbies, talents and experiences which involve the use of the right hemisphere of the brain. I tested 124 subjects ranging from elementary age students to teachers and other adults. Over three times as many "creative" people (artists, dancers, etc.) used their right hemisphere in the experiments. Interestingly, a connection also appeared between left-handedness and use of the right hemisphere of the brain. Thirty-five percent of left-handers tested used their right brain to do the experiments, while only 16.3% of right-handers tested used their right brain to do the experiments. Therefore, slightly more than twice as many, percentage wise, left handers used their right brain in my tests. No significant difference was found in my test results in gender and use of the right brain. Only 2.4% more females than males, percentage wise, used their right brain in my experiments.

Board J @ 2:30 **CAN WHEY PROTEIN AND CMC BE USED AS A BINDING AGENT IN A GRANOLA BAR?** Pam Daly, 4191 Greensview Dr., Columbus, Ohio 43220

The objective of this project is to discover a feasible high protein food source, that can be utilized to feed the increasing world population. Whey, a dairy by-product, was chosen because it is a superior source of animal protein with both nutritional and functional properties. The research focuses on the application of knowledge acquired in the previous three years of research. My past research shows that whey protein enhanced growth 15.5% and has a P.E.R. of .152 on newly weaned rats. The ongoing research involves the recovery of a protein-hydrocolloid complex from whey. The CMC will be used to replace sugar as the binding ingredient to form a granola bar high in protein and low in calories. My experimentation deals with extracting the whey protein using CMC, and determining an appropriate composition for a nutritional granola bar. After the amounts of ingredients are determined, I will find the correct proportion of base granola to water and CMC. My tests have been successful in producing a bland but well-bonded high-protein granola bar containing 31.4% less calories, 76.3% less fat, 41.8% less sodium and 30.2% more protein than Nature Valley's Oats 'n Honey granola bar. The evaluation of the granola bar will be determined based on overall quality, and calculated amounts of nutrients including essential amino acids, binding quality, and taste.

O. Engineering
First Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 114
Miles Free, Presiding

9:00 SILICON MICROMACHINING: "THE FINAL FRONTIER" OF SILICON

Ramsey, Keith A., Battelle, 505 King Avenue, Columbus, OH 43201

Silicon is increasingly being used in a variety of products and research efforts not because of its electronic properties, but rather because of its mechanical properties. Silicon micromachining is the three-dimensional sculpting of silicon to create extremely tiny channels, diaphragms, wells, bridges, and beams for sensor and actuator applications. This review highlights the basic techniques used to fabricate micromechanical structures. Several examples of micromachined silicon components, ranging from commercial products such as pressure sensors and accelerometers to futuristic microscopic gears and motors, are illustrated. Finally, this paper describes recent micromachining research conducted at Battelle and possible future applications.

9:15 REVERSE ENGINEERING. Dr. Robert J. Abella, Dr. James M. Daschbach, Dr. Roger J. McNichols, Department of Industrial Engineering, University of Toledo, 2801 West Bancroft Street, Toledo, Ohio 43606

Reverse Engineering describes an application in which an existing part or physical model is used to create a computer model for the purpose of analyzing, improving, and reproducing the original part. The critical elements in reverse engineering are to accurately digitize the part contour and fit geometry to the digitized information in order to define the part in a CAD system. Fitting the describing geometry to the measured points can take place within the CAD system or at the measuring source prior to input to the CAD system. This presentation discusses a reverse engineering system based on a coordinate measuring machine (CMM) which can digitize the part contours, fit geometry to the digitized data, and transfer geometric entities to a CAD system. There are significant advantages associated with fitting geometry at the digitizing source rather than by a CAD operator. The advantages include an improvement in the accuracy of the resulting CAD model and a significant reduction in the time and effort required to construct the model from the digitized point data. The advantages are illustrated with several parts which were reverse engineered for local firms.

9:30 ESTIMATION OF TENSILE AND YIELD STRENGTS FROM BALL TEST.

Dr.J. Daschbach, Zeynel Arslanoglu. The University of Toledo Industrial Eng. Dept. 2801 W. Bancroft, Toledo, OH, 43606

A hardened steel ball is pressed into metal surface and the diameter of the indentations resulting from different load and ball levels are measured. The concluded relationships are used to estimate the yield and tensile strengths of test metals. The model is $L/D^2=A(\ln(\cos h(\Theta)))^S$ where A and s are collected from ball indentation test. The parameter Θ is the indentation angle and equal to $2\sin^{-1}(d/D)$. The parameters in the equation are defined as 'L', load in pound, 'D', diameter of ball and 'd', diameter of indentation in inches. The correlation of tensile and ball parameters is given by $S_u/K_d=0.238$ where K_d is the regression value at pi radian and S_u is the tensile strength of the metal. The indentation angle for the yield strength is given by the equation, $\Theta_y=3.763-2.42\cdot s$ By substituting Θy in the model, L/D^2 gives the yield strength of metals. The percent error of the estimation using the model varies from 3.5 to 9.5 % for tensile strength and from 1.1 to 22.4 % for yield strength, although, the difference is only 1.5 ksi for 22.4 % error.

9:45 **EXPERIMENTAL INVESTIGATION OF THE TURBULENT FLOW DEVELOPMENT IN THE ENTRANCE REGION OF A CURVED TUBE USING LASER ANEMOMETER**

R. S. Fatemi, Ph.D., Deptartment of Biomedical Engineering, University of Akron, Akron, Ohio
K. B. Chandran, D.Sc., Dept. of Biomed. and Mech. Engr., University of Iowa, Iowa City, Iowa

Details of the flow development in the entrance region of a circular cross-section 90° bend pipe with a curvature ratio of 0.1 were investigated. Two components of the velocity in axial and transverse directions were measured by method of laser Doppler anemometry (LDA) in five cross-sectional planes at 5, 30, 50, 70 and 90 degree angles from the plane of the pipe inlet at Dean number of 6850. Results of this study show that due to the curvature of the pipe, a secondary motion is initiated immediately downstream of the entrance. However, the flow never becomes fully developed in the 90° bend. The shape of the velocity profiles as well as comparison of the magnitude of the velocity fluctuations to the magnitude of the mean axial flow prove that the flow is indeed fully turbulent for this Dean number. These results do not support the existence of a four vortex flow, and no separation was evident anywhere in the flow at this Dean number. In planes parallel to the plane of symmetry at downstream positions near the inner bend, a double peak velocity was observed which is attributed to the fluid acceleration due to the re-entrance of the secondary flow to the core region.

10:15 AN OVERVIEW ON THE USE OF RECYCLED MATERIALS IN PAVEMENT CONSTRUCTION. Y.J. (Eddie) Chou, Department of Civil Engineering, The University of Toledo, 2801 W. Bancroft Street, Toledo, OH 43606

The nation's aging highway and street systems will need major rehabilitation in the coming decades. In many areas of the United States, good quality road-building aggregates have become scarce. On the other hand, a huge amount of wastes need to be disposed of every year. Many of the materials currently go into landfills such as used tires, glass, and plastics are potentially useful as road-building components. Pavement recycling using existing materials has been used by several states. The use of scrapped tires in asphalt concrete has shown to be beneficial in reducing its temperature susceptibility which causes low-temperature cracking. Glass, plastics, and fibers may be used as aggregates substitutes or as part of the asphalt concrete. Research efforts are needed in evaluating the structural properties of the recycled materials and in determining the influence of using these materials on pavement behavior. More importantly, techniques that can economically incorporate recycled materials in pavement construction must be developed.

10:30 MEASURE OF EFFECTIVENESS IN TRAFFIC CONTROL THROUGH RUMBLE STRIP INSTALLATION. Jiwan D. Gupta, Associate Professor of Civil Engineering and Amit Kothari, Graduate Student, The University of Toledo, Toledo, Ohio 43606.

Rumble strip installations have been used in the vicinity of construction sites, approaches to toll plazas, curves and intersections with inadequate stopping distance caused by vertical or horizontal alignment. The installation of rumble strips serve two purposes, one is to alert drivers of unusual or unexpected traffic conditions and the other is to help in speed reduction. At present there is no set policy standards on the design and placing of rumble strips.

A research study was sponsored by the Ohio Department of Transportation (ODOT) to design rumble strips and various other parameters associated with it. An evaluation of various designs were carried out through installing rumble strips in the field and measuring speed at the rumble strip installation locations.

The analysis of field data indicated that rumble strips do alert drivers. Speed reduction of 12 miles from the initial speed was observed within 300 feet of the first rumble strip pad. Three to four pads are better than a larger number of pads, as errors in mean response time increases with increasing number of stimuli.

10:45 HIGH VOLTAGE TESTING OF GASEOUS INSULATION. Monir Ahmad, The Pennsylvania State University at Erie, The Behrend College, Station Road, Erie, PA 16563-1200.

This paper presents a new approach to determining impurities in gaseous insulation used for high voltage equipment. High voltage at high frequency in the audio frequency range when applied to a gas results in ionization and visible glow. Experimental results are presented showing that the intensity of glow depends on the nature and the amount of impurity. If the voltage is suddenly cut off, the glow does not stop instantaneously but, instead, decays to zero over a period of time - a phenomenon called afterglow. It is shown with the help of experimental results that the lesser the impurity, the larger the intensity of glow. In addition to this, it is shown that the time of afterglow also decreases with the amount of impurity. A method has been developed for glow and afterglow measurements for impurity assessment in the insulating gasses. It has been discussed that the method cannot only be employed for determining impurities in gaseous insulation but can also be used for impurity determination in the inert gasses used for other applications.

O. Engineering
Second Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 147
John Durkin, Presiding

9:00 DELAY-EVALUATION OF CMOS LOGIC GATES WITH CHAINS OF SERIES TRANSISTORS, Srinivasa Vemuru and Edwyn Smith, Department of Electrical Engineering, The University of Toledo, Toledo, Ohio 43606.

Delay-evaluation of CMOS logic gates is used in development of a number of computer-aided design tools for VLSI such as timing simulators, circuit optimizers, etc. We are proposing a macromodel to evaluate the delays in CMOS static logic gates that include chains of series transistors such as NAND and NOR gates and with a single active input that is changing state between the power supply voltages. The model takes into account the rate of the input waveform assumed to be a ramp, load capacitance, transistor sizes and the location of the active input in the chain of series transistors.

As the input waveform changes state from one logic level (V_{DD} or V_{SS}) to other, the CMOS logic gate goes through different regions of operation based on whether the MOS transistor with active input at its gate is operating in linear, saturation or cut-off regions. Equivalent circuits are developed in each of these regions of operation. The differential equations that govern the behavior of these equivalent circuits are solved either analytically or by using power-series approximations to obtain the output voltage and propogation delays.

The delays obtained from the simulations based on the model agree within 10% of SPICE based simulations for a wide range of variables. SPICE simulations require upto hundred times more computation time than the proposed macromodel based simulations.

9:15 **A SOLUTION TO A CONSTRAINED RECTILINEAR STEINER PROBLEM.** Antonije D. Jovanovic EE Dept, The Univ. of Toledo, Toledo, OH 43606

This paper presents an O(n) solution, in the number of net terminals, to the problem of minimal wire length routing for a single multiterminal net whose terminals are constrained to two parallel rows of terminals. A more general frame for this problem is the Rectilinear Steiner Problem (**RSP**) that was first considered in connection with the printed circuit technology. Along with many other problems encountered in the VLSI layout design, the general RSP has been proven NP-complete, but a polynomial time solution algorithm has been found for the special case when all terminals are placed on the boundary of a rectangle. Based on another polynomial algorithm for the related Steiner problem on graphs, it has been shown in general terms, that placement of terminals on a boundary of a convex region in the plane always makes the solution of the Steiner tree problem easier. The case of routing between two rows of terminals to which the results of this paper directly apply, presents an even more restricted special case than those previously considered, so the O(n) computational complexity of the new solution procedure described in this paper is in agreement with the existing theory. A formula has also been derived that determines the absolute lower bound on the wiring length, given the geometry of terminal rows and the net list.

9:45 MODELING OF PARALLEL ALGORITHMS ON HYPERCUBE. Dr. Devinder Kaur, Dept. of Electrical Engineering, The University of Toledo, Toledo, OH 43606-3390.

The paper describes the multicomputer hypercube. Hypercube is a versatile architecture ifrom where the other topologies like two-dimensional mesh, three-dimensional mesh, ring, and an unbalanced tree can be derived by traversing the nodes in a particular fashion.

A generalized hypercube has $N = r^n$ nodes, where n is the dimension of the hypercube and r is the number of nodes in each dimension. Binary hypercube is a special case of generalized hypercube with two processors in each dimension. In a binary hypercube each node/processor is connected to $\log_2 N$ adjacent neighbors, where N is the total number of processor nodes in a hypercube. The maximal communication diameter in a hypercube comprising N nodes is $\log_2 N$ as compared to N/2 and $\sqrt{N}$ in similarly sized rings and meshes respectively.

The analysis of various binary algorithms has been done to achieve efficient mapping on the hypercube. N operand binary algorithm can be done in $\log_2 N$ steps on a hypercube with many operations being done in parallel by the different nodes of the hypercube.

Fast Fourier Transform algorithm for the computation of Discrete Fourier Transform has been analyzed and its mapping on the hypercube is shown along with the speed up achieved in the process. The use of hypercube as a relational database engine is illustrated.

10:00 SELECTING APPROPRIATE EXPERT SYSTEM APPLICATIONS IN THE SCIENCES
John Durkin, Professor Electrical Engr. The University of Akron; Akron, OH 44325

Interest in the application of expert systems in the sciences has been growing dramatically during the past decade. Systems have been built to aid engineers in designing electronic circuits, chemists in determining unknown molecular structures, and geologists with interpreting survey data. Other successful systems have been developed but all share one important point; the problem was suited to expert system application.

The history of expert system applications is filled with stories of both successes and failures. Reasons for past failures can often be traced to a misunderstanding of the capabilities and limitations of expert systems. An expert system is a valuable tool, however like any other tool, if misapplied failure is likely.

This paper provides guidelines for choosing appropriate applications of an expert system in the sciences. These guidelines can be used in evaluating a potential expert system project to maximize the likelihood of success. A general introduction is given on expert systems and discusses their value in the sciences. Reference is given to past projects and insight provided into potential future applications of expert systems in the area of science. The paper also provides particular recommendations to organizations considering expert system projects for the first time.

10:30 ON THE HIGH RATE CODING AND DECODING BY USING THE PUNCTURED CODE
Junghwan Kim, the University of Toledo, Dept. of Electrical Engineering, 2801 W. Bancroft St., Toledo, Ohio 43606

Trials to find an optimal code for the digital communication without bandwith expansion or extra power has been successful in finding the Ungerboeck's TCM code recently. This technique makes full use of the spacing structure of signal. However, the complexity in TCM code for higher gain turns out to be major drawback. The so-called puncture coding technique to all code rate (n-1)/n deletes a fraction of the symbol generated by the rate 1/2 code, but utilizes the same decoder as the latter, with the deleted symbol replaced by erasures. The major advantage of the puncturing is that same decoder can be employed, virtually unchanged other than in its branch metric generation, which inserts erasures for punctured symbol. To obtain the simplified general coder/decoder for M-ary signal, mapping the M -ary signal to binary codes then apply to the puncture coder and decoder. This combination can achieve both optimal signal mapping and simplest coding/decoding scheme as rate 1/2 code.

O. Engineering
Third Morning at 9:00 am
SATURDAY, APRIL 27, 1991
University Hall 151
Thomas Hartley, Presiding

9:00 USING P.C. TO CONTROL POWER DISTRIBUTION.
Monir Ahmad, The Pennsylvania State University at Erie, The Behrend College, Station Road, Erie, PA 16563-1200 and Michael R. Emanuele, Engineering Department, International Paper, Erie, PA 16533.

This paper describes the use of P.C. to operate and control the power distribution equipment. Currently, several types of relays or programmable logic controllers are being used for the control of power distribution equipment. The approach presented here describes how all these devices can be replaced by a central controller which can be easily interfaced with a P.C. using a software. The basic functions involved in power distribution are described and classified into appropriate categories, and their implementation with a microprocessor is discussed to develop an efficient control system. The hardware components involved to compose the system are identified and the software required to operate, monitor, and control the system has been proposed. Modular design of hardware and software has been explained for easy expansion and modification to suit a desired application. The proposed scheme is highly reliable, maintenance free, and cost effective compared to the currently used methods.

9:15 SECURITY CONSTRAINED OPTIMAL POWER DISPATCH USING NONLINEAR PROGRAMMING. Monir Ahmad, The Pennsylvania State University at Erie, The Behrend College, Station Road, Erie, PA 16563-1200.

A simple decoupled approach to solving the overall optimal dispatch problem consisting of both real and reactive powers has been developed. The overall problem is solved by sequentially solving two nonlinear subproblems for real and reactive powers separately. Coupling between the subproblems is handled by a simple technique which makes the sequential solution of the subproblems to converge to the solution of the original problem without the necessity of iterating with an AC load flow solution. The concept of approximating the Jacobian of decoupled load flow equations with constant B-matrices is used in a general nonlinear optimization process. The decomposition into smaller subproblems reduces computer memory requirement and the use of constant matrices reduced computational time. Two types of objective functions have been discussed for the real power subproblem. A simple feasibility objective has been suggested for those power systems where the losses are insignificant, and a loss objective has been suggested for those where losses are significant. Successful results on the IEEE 118-but system have been obtained. A special purpose sparsity oriented code based on this method would produce very fast solutions.

9:30 A CONTINUOUS-TIME SELF TUNING REGULATOR TECHNIQUE FOR POWER SYSTEMS STABILIZERS. Ahmad M. Farhoud, Adel A. Ghandakly, Department of Electrical Engineering, The University of Toledo, Toledo OH 43606

A continuous-time self tuning regulator technique which employs a recursive least squares identification and an optimal control design is proposed. The proposed controller has flexible structure which can emulate many practically known structures with proven effectiveness such as conventional and PID power system stabilizers. The controller design is carried out by applying optimal output feedback design theory to the linear identifying model. A linear quadratic performance index is minimized using gradient and line searching techniques. The proposed method outperforms the fixed parameters conventional and the minimum variance stabilizers when applied to a simulated single-machine power system.

9:45 REFLEXIVE MATRICES. Javad Habibi and James Smith, Department of Math and Computer Science, Muskingum College, New Concord, Ohio 43762.

An algebra A of nxn matrices over the field K is reflexive if every element of Mn(K) that leave invariant subspaces of A is in A. An nxn matrix A in Mn(K) is reflexive if the algebra generated by A is reflexive. We characterize those matrices that are reflexive. If $k_1 \geq k_2 \geq \ldots \geq k_n$ be the partial multiplicities of eigen value r, then A is reflexive with respect to r in case $k_1 \geq k_2+1$.

10:00 THE GAP OF THE GRAPH OF A NORMAL MATRIX. Javad F. Habibi. Department of Math and Computer Science, Muskingum College, Main St., New Concord, Ohio 43762.

The gap between two subspaces N and M is defined as the norm of P - Q where P and Q are orthogonal projection on M and N respectively. For a matrix A let the graph of A be the set of all (v, Av), where v is the domain of A. The gap between the graph of a normal matrix with a subspace is $||A||/(1+||A||)^{0.5}$.

10:15 COMPUTER GENERATION OF CATALAN NUMBERS, C(N), BY DETERMINING THE NUMBER OF WAYS TO PARENTHESIZE A NON-ASSOCIATIVE PRODUCT. Thomas Dence, Dept. Mathematics, Ashland Univ., Ashland, OH 44805

The Catalan numbers, C(n), are generated in a variety of ways, usually either directly using binomial coefficients, or recursively. Specifically, they appear in parenthesizing non-associative products of n+1 factors. We present here an easily programmable algorithm, with emphasis on the gap between successive zeros in a certain binary representation, that performs all the different parenthesizings, thus yielding C(n) as a side result.

O. Engineering
First Afternoon & Business Mtg. at 1:30 pm
SATURDAY, APRIL 27, 1991
University Hall 114
Thomas Hartley, Presiding

2:00 CONTROL SYSTEMS THEORY AND APPLICATIONS AT THE UNIVERSITY OF TOLEDO. James B. Farison, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606-3390.

Control systems theory and applications are important areas of instruction and research in the College of Engineering at UT. Primary activity is in the 18-member Department of Electrical Engineering, where four faculty members constitute the Control group. The 1991-93 Catalog lists four undergraduate and eight graduate courses in control, with numerous additional supporting courses in mathematics and engineering departments. Recent activity has been stimulated by an OBOR Academic Challenge grant in Flexible Manufacturing Systems, shared with the industrial and mechanical engineering departments.

All BSEE students have one required course, Linear Feedback Control, which builds on prior courses in signals and systems. They may choose the Systems and Control specialty for their technical electives, selecting from Control Systems Design I and II, Robotics, and several related courses. Graduate courses include Sampled-Data Control, Discrete-Time Multivariable Control, Nonlinear Control, Adaptive Control, Control of Robotic Systems, Optimal Control Theory I, II and III, and many supporting subjects. Doctoral students may choose Control as one of their Comprehensive Exam areas.

Current research areas include optimal control of robotic systems, robust control design for discrete-time systems, stability and control of power systems, and optimal control of solar heating systems.

2:15 CONTROL ENGINEERING AT THE UNIVERSITY OF AKRON. J.A. De Abreu-Garcia and T.T. Hartley, Department of Electrical Engineering, The University of Akron, Akron, Ohio 44325-3904

The Electrical Engineering Controls Program accounts for about 35% of the graduate student population within the department. Undergraduate students are first introduced to controls via classical and discrete-time control courses. Graduate courses may be taken either as post-baccalaureate or towards the Master's or Ph.D. degrees. A non-thesis Master's option is available. Assistantships are available for full-time students. Part-time students are encouraged to pursue research benefitial to their employer. Course offerings include system theory and simulation, adaptive, robust, nonlinear, optimal, and intelligent control, model reduction, and distributed parameter systems. An additional 10-15 control related graduate courses are offered in Electrical Engineering and other departments. Most courses are offered annually while special topics are offered on demand. Independent studies are also possible.

2:30 CONTROL SYSTEMS EDUCATION IN ELECTRICAL ENGINEERING AT THE OHIO STATE UNIVERSITY

Stephen Yurkovich
Department of Electrical Engineering
The Ohio State University
2015 Neil Ave, Columbus, OH 43210

This presentation provides an overview of control systems education within the Electrical Engineering Department at The Ohio State University. The Control Systems Group is comprised of eight faculty members who regularly teach undergraduate and graduate courses in the control systems area, with approximately 40 graduate student research and teaching assistants. Undergraduates take three courses in their core requirements: Signals and Systems I and II, and the Signals and Systems Laboratory. In addition, as senior electives, undergraduates regularly choose from a selection of eight courses in control systems (also available for graduate credit), covering topics in classical and modern control, digital control, nonlinear control, stochastic systems, and hands-on laboratory work in digital control systems. Advanced topics in Control Theory are offered in eight graduate courses, including linear systems theory, stochastic control, adaptive control, nonlinear and robotic systems, optimal control, large scale systems, advanced frquency domain design, and discrete event systems. As highlighted in the recent article "A Survey of Control System Education in the United States" (*IEEE Trans. on Education*, August 1990), the Control Systems Group in Electrical Engineering at Ohio State is among the leaders in the country in terms of number of faculty and numbers of MS and Ph.D. degrees produced annually (averages of 12 MS and 3 Ph.D.). This broad range of courses and active graduate program has placed the Control Systems Group among the leaders in the nation in control systems research productivity, with sponsored research programs for various organizations including NSF, NASA, AFOSR, DARPA, NATO, Livermore Labs, Sandia Labs, General Motors, Ford, and several others.

2:45 STOCHASTIC NOISE IN HIGHLY NONLINEAR CONTROL SYSTEMS. Faisal Abbas, The Pennsylvania State University at Erie, The Behrend College, Station Road, Erie, PA, 16563-0203, and C. Constantinides, University of Wyoming, Department of Electrical Engineering, Laramie, WY, 82071.

Very often in practical applications, the input to nonlinear control systems is unknown. This is due to the result of random forces acting on the physical system. Such examples are the flight path error of an aircraft caused by wind gusts, and the input results from the imperfect measurement of a physical quantity such as the position of a moving target as determined by radar. A number of design techniques to overcome this problem are available in control engineering literature, however, none of these methods mention the possibility that such stochastic sources could lead some systems to what is now referred to in literature as chaotic motion. In this work, the response of a feedback system to a systematic input corrupted by wideband random noise is heavily investigated on the digital computer. Initial numerical data show that different bands or random white noise, the time of corrupting the system with such noise, and the level of the noise play a drastic role in the behavior of such systems.

3:00 **MATHEMATICAL MODELLING AND COMPUTER SIMULATION AND CHAOTIC THEORY. John Jones Jr. Air Force Institute of Technology School of Engineering Wright-Patterson AFB, 45433**

The main purpose of this work is to treat the problems of mathematical modelling and computer simulation of dynamical systems which have applications in the fields of medicine, health science, computer science, engineering, mathematics, economics, game theory, population growth, ecology, biology, pollution, highway traffic, algae growth, tidal dynamics, fish harvesting, earths magnetic field changes, insect growth, modelling of diseases, etc.

The basic mathematical nonlinear systems of equations which contain multiparameters which must be determined in order to model such diverse systems will be considered. Parellel processing on large scale computer systems is necessary in order to display graphics involved in the various simulations of these diverse areas of research.

3:30 A HIERARCHY FOR MODELING HIGH SPEED PROPULSION SYSTEMS, Tom T. Hartley, Department of Electrical Engineering, The University of Akron, Akron, OH 44325.

Advanced aerospace design concepts require propulsion systems which operate at very high speeds. These high speed propulsion systems are typified by supersonic inlets, ramjets, scramjets, and nozzles. Controlling these systems is a very difficult task. This is true, in part, due to the difficulty associated with obtaining an accurate, yet useful, model of the system. A modeling heirarchy is given below to help the control system designer in choosing an appropriate model. All of the modeling methods are based on the 1-D Euler equations of non-viscous, compressible flow.

- CFD Based Models: Large perturbation nonlinear models, high order
  - High Accuracy: Implicit, Multidimensional
  - Medium Accuracy: Explicit Second Order-MacCormack, L-W
  - Low Accuracy: Split Flux(Steger, van Leer), Physical Lumping
- Linear Models: Small perturbation, high order
  - CFD Based: Split Flux, Physical Lumping
  - Approx Hyperbolic System Solution: Cole-Willoh, Pade delays
  - Exact Hyperbolic System Solution: Sarantopoulos-Cole-Willoh Meromorphic transfer functions
- Reduced Order Models:
  - Of Nonlinear Systems: Methods not available
  - Of Linear Systems: Balancing family, Hankel norms
  - Of Meromorphic TF's: Pade, Approx. Hankel Operator
  - Identification: LS, TLS, RLS

All of these approaches must give special attention to boundaries and inputs, e.g.-shocks, choked flow, buzz, unstart, fuel flow, by-passes, etc.

This research supported by The Advanced Control Technology Branch, NASA Lewis Research Center via grant NAG 3-904.

O. Engineering
Second Afternoon at 2:00 pm
SATURDAY, APRIL 27, 1991
University Hall 147
Miles Free, Presiding

2:00 GAGE CAPABILITY STUDIES TO JUSTIFY OPTICAL GAGING FOR PROCESS CONTROL. Miles Free. Bliss & Laughlin Steel Co., 900 West Smith Road, Medina, Ohio 44256

Statistical gage capability (repeatability and reproducibility) studies were employed on a process experiencing high rejections for size. These studies identified weaknesses in the process gaging and allowed the justification of a higher resolution optical laser gage.

Acceptance testing by the same methods showed the new gage would consistently perform to less that 6% of tolerance.

Formulas and techniques for performing GRR studies are covered, as are savings based upon experience with new laser gage.

2:15 APPLYING MATHEMATICAL MORPHOLOGY IN THE DETECTION AND VISUALIZATION OF POROSITY IN INDUSTRIAL COMPUTED TOMOGRAPHY SCANS OF ALUMINUM DIE CASTINGS

Jeffrey A. Schindler
Medical College of Ohio / Information Systems
3000 Arlington Ave.
Toledo, Ohio 43614

Porosity is an inherent result in the aluminum die casting production process. Often times these regions of porosity are produced in areas requiring machining or in an area where the porosity might provide a pathway for air or water from one chamber to another. These regions result in leak paths and, therefore, a defective part.

Many non-destructive techniques, such as fluoroscopy and pressurization in water, are presently applied to the problem of porosity detection. This paper presents a new technique that uses industrial computed tomography (CT) scans of the castings to detect and measure the connectivity of the porosity to determine if there are leak paths present.

Three dimensional binary and gray scale mathematical morphology algorithms were developed to extract the porosity data from the original data. The CT data is transferred via the Ohio Academic Resource network (OARnet) to the Cray Y/MP at the Ohio Supercomputer Center where these algorithms are applied. Once the binary porosity data is extracted, connectivity analysis is performed to determine pathways of the porosity.

Three dimensional reconstructions of the casting with the porosity regions highlighted are computed using the animation production Environment (apE) developed by the Ohio Supercomputer Graphics Project. These renderings provide an easily comprehendible visualization of the resultant porosity. The entire process shows much promise in the design of new castings and in the quality control of the existing production.

* This work was partially funded by the Cray Research Foundation

2:30 OBJECT RECOGNITION OF THE FUNCTIONAL ANATOMY OF THE HEART FROM MAGNETIC RESONANCE IMAGES USING A BLACKBOARD MODEL OF PROBLEM SOLVING.

Mahmoud K. Habboub
Medical College of Ohio/Information Systems
3000 Arlington Ave.
Toledo, Ohio 43614

Performing quantitative cardiac analysis from digital images acquired by Magnetic Resonance Imaging (MRI) requires the identification and extraction of the cardiac anatomy. The location of the LV, including endocardium and epicardium must be determined in order to calculate motion, thickening and ejection fraction information. Currently, these regions are traced by an expert observer using a workstation. However, manual tracing is prone to inconsistency and is too labor intensive to analyze large three dimensional MR data sets.

We have applied the blackboard model of problem solving to allow integration of low-level vision processes traditionally associated with image processing, domain specific knowledge from multiple knowledge sources and segmentation using a localized histogram and region merging algorithm. The combination of these technologies allows the application of *a priori* knowledge about the images being analyzed to guide the segmentation and classification process.

Our blackboard system has been applied to the analysis of 20 MR cardiac studies comprised of males/females, a variety of age groups and disease states. Each study contains 49 images over the systolic phase of the cardiac cycle. Initial results demonstrate satisfactory segmentation of the LV cavity, the lung field and over 80% of the epicardium in all patients. Future work will carefully address the right ventricular region.

2:45 INTERNAL DEFECT DETECTION AND MATERIAL DISCRIMINATION BY MULTI-ENERGY CT IMAGE PROCESSING. Xia He and James B. Farison, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606-3390.

The adaptation of the medical imaging technique called computed tomography (CT, or CAT scan) to industrial inspection applications is beginning to come of age. With an industrial tomography scanner, one is able to rconstruct a map of the internal features of an object, based on their distinctive x-ray absorption properties. Not only do absorption properties vary with different materials, they also vary with the x-ray energy. Thus, additional CT data can be obtained by scanning the object repeatedly with different beam energies.

By forming an object reconstruction for each of these distinct energies, a set of images of the same features under different energies is obtained. This set, which contains more information than any one image, can be processed to form one composite image with a desired feature, such as a specific material composition, emphasized and other undesired features suppressed. In this new data-compressed image, regions containing the desired material composition are highlighted relative to others, thereby aiding the detection of material boundaries, defects or other internal features of interest not visible in a single image.

Original image sets and filtered images from the industrial tomography scanner of the Edison Industrial Systems Center, Toledo, are presented to illustrate the potential of this filtering technique for industrial inspection applications.

3:00 IDENTIFICATION, COMPRESSION AND RECONSTRUCTION OF SPATIALLY-INVARIANT IMAGE SEQUENCES.Young-In Shin and James B. Farison, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606-3390

Spatially-invariant image sequences occur in a variety of engineering and medical imaging applications, including multispectral earth satellite images, and nuclear, x-ray, CT and MR medical images. Such sequences are obtained by the variation of some (spectral, temporal or parametric) property of the object or imaging system, such that the intensity (gray-scale value) of the features (but not the location) changes from image to image. For SI images, the spatial and sequential variation of each image formation component (feature or process) of the object or scene can be factored into the product of its spatial distribution (gray-scale map) and its variation (signature) over the sequence.

This paper presents new results for the processing of spatially-invariant image sequences. For image sequences in which the various image formation components are linearly additive, it is shown that linear filtering can be used to identify the spatial distribution of each such component in the image sequence. These spatial distribution functions represent a method of compression of the original sequence of K images into a set of P images (where P is the number of image formation components). Then, the original sequence, or any filtered version or subset of the sequence can be reconstructed from the compressed sequence. Finally, the issues represented by image noise are considered, in terms of the effect on the identification of image component maps and on the reconstructed sequence.

3:15 MAGNETIC RESONANCE IMAGE ENHANCEMENT BY DIGITAL SUBTRACTION. Whan Y. Koh & James B. Farison, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606-3390 and Gareth Williams, Department of Radiology, Medical College of Ohio, Toledo, OH 43699-9988.

Results of a recent study concerning the application of digital subtraction, a technique widely used in digital radiography, to magnetic resonance (MR) images are presented in this paper. By subtracting two MR echo images of the same anatomy under different imaging conditions, the final image will be a contrast-enhanced image of the anatomic structures, which may allow better tissue characterization and differentiation.

The application of interest in this study is the human brain. The goal is an MR image enhancement procedure, combining digital subtraction with existing image processing techniques, to improve the capability to reveal normal and abnormal anatomic structures and different pathologic states. The challenge is that the noise in MR images may be worsened by digital subtraction unless other appropriate image pre- and post-processing is incorporated.

The results of this preliminary study show that the location of the suspicious tumor area can be enhanced and the contour of the tumor area more clearly outlined in the enhanced digital subtraction images of three different patients. Pseudo-color is also investigated for improved human viewing of the enhanced images.

3:30 TOMOGRAPHIC IMAGE RECONSTRUCTION FROM PROJECTIONS: SINGLE-PASS REALIZATIONS OF ITERATIVE METHODS. Moufid Elhazzouri & James B. Farison, Department of Electrical Engineering, The University of Toledo, Toledo, OH 43606-3390 and Behrouz Shabestari, Edison Industrial Systems Center, 1700 N. Westwood Avenue, Toledo, OH 43607-1207

This paper investigates the computational structure of several linear iterative algorithms for CT image reconstruction from projections by formulating matrix models of the algorithms. These models clarify the similarities and differences in the algorithms and in the respective reconstructed images. They also show explicitly the effect on the reconstructed image of the initial estimate and the projection data.

Another important result of these models is an explicit form for the final image obtained from each iteratuve algorithm. This form permits the comparison of these methods with each other and with the pseudo-inverse solution. It also provides a computational alternative to the iterative algorithm, in which a (pre-computed) system matrix times the projection data vector gives in a single-pass calculation the reconstructed image equivalent to any number k of iterations (including the final image). Practical computational issues are also addressed. Current work involves the conversion of the single-pass formulation, developed for parallel-beam tomography, to the fan-beam geometry of contemporary CT systems. Future plans include the experimental evaluation of this single-pass alternative for actual CT image data from the industrial tomography unit of the Edison Industrial Systems Center.

O. Engineering
Third Afternoon at 2:00 pm
SATURDAY, APRIL 27, 1991
University Hall 151
Y. T. Hung, Presiding

2:00 DOMESTIC SEWAGE TREATMENT USING STABILIZATION POND FOLLOWED BY MATURATION POND
Aik-Heng Lee, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

A field study was conducted to evaluate the treatment performance of domestic wastewater treatment plant using two stabilization ponds followed by a maturation pond. For the period of 1-year study, the overall removal efficiency of BOD (biochemical oxygen demand) was 61.98 and 78.57% for stabilization and maturation loading increased. The overall SS (suspended solids) removal efficiency was 39.60 and 56.46%, respectively. The ammonia nitrogen removal efficiency was 39.6 and 79.78%, respectively. The averaged TCC (total coliform count) was 1.4 X 10^6, 1.9 X 10^5, and 6.7 X 10^3 FC/100 ml, for influent, stabilization pond effluent, and maturation pond effluent, respectively. The effluent had high TCC value exceeding the general accepted level and would require disinfection facility.

2:15 INDUSTRIAL WASTE TREATMENT IN MALAYSIA
Aik-Heng Lee, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

In Malaysia, most industrial plants have a great deal of problems treating their wastes. These plants include palm oil mills, pulp and paper mills, textile plants, food processing plants, fruit cannery plants, and others. Among various industries, two thirds of the plants produce waste during their operational processes. The types of wastes produced were classified into solids, liquids, and gases. With the types of industrial waste generated, liquid wastes are most commonly treated (90%) comparing to the solids (50%) and liquids (40%) wastes. Most of the plants know how to treat their wastes to meet the Malaysian Environmental Quality requirement. The needs of upgrading current knowledge of techniques used in industrial pollution control is emphasized.

2:30 WASTEWATER TREATMENT WITH SAWDUST. Venkateshwar Rao Durgam, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115, Ruth Yu-Li Yeh, Chemical Engineering Department, Ming Hsin Engineering College, Hsin Chu, Taiwan.

Objective of the laboratory study is to determine the effectiveness of sawdust in removing TOC (total organic carbon) and turbidity from potato wastewater and in increasing light transmittance for dye wastewater. Types of sawdusts used included red oak and white oak. For potato wastewater treatment, sawdust addition decreased turbidity, especially for high strength potato wastewater. However, the reduction in TOC was insignificant. For dye wastewater treatment, sawdust of red oak is effective in increasing light transmittance for direct-blue CI-78 dye, but is insignificant for other types of dyes such as acid red, basic red, disperse red, direct yellow and basic yellow. It also devreased pH from 8 to 3.

2:45 WASTEWATER TREATMENT BY SAND COLUMNS WITH BIOAUGMENTATION. Nainesh Patel*, Yung-Tse Hung*, Howard H. Lo**, *Civil Engineering Department, **Department of Geological Sciences, Cleveland State University, Cleveland, Ohio 44115

A laboratory study was conducted to determine the feasibility of using sand columns with bioaugmentation for treatment of potato and sugar wastewaters. Four continuous flow sand columns were with bioaugmentation. Two sand columns were without bioaugmentation and used as control columns. The experimental parameters were bioaugmentation conditions and hydraulic detention time in the columns. Results indicate that up to 80% organic removal was achieved by sand columns with bioaugmentation. Bioaugmented sand columns had higher suspended solids reduction over the control columns and acheived 75 to 85% reduction. Bacterial population depended on the organic removal.

3:00 POTATO WASTEWATER TREATMENT BY YEAST PROCESS. Srinivas Seela*, Yung-Tse Hung*, Howard H. Lo**, *Civil Engineering Department, **Department of Geological Sciences, Cleveland State University, Cleveland, Ohio 44115

The laboratory study was conducted to determine the efffectiveness of yeast process for treatment of potato wastewaters. Eight reactors of different diameters were employed to determine the effect of yeast process with different operational factors including hydraulic detention time, types of filter media, and strength of potato wastewaters. Two reactors were operated as control reactors. Two types of filter media used included plastic ring and stones. The wastewater sttength included 1000, 600, and 200 mg/l TOC (total organic carbon). Beer yeast was used as yeast culture in the reactors for conversion of organic to yeasts. The TOC removal efficiency varied from 35 to 50 % for control reactors. The total suspended solids removal was from 30 to 40 %.

3:15 OPTIMAL OPERATION CONDITION OF POTATO WASTEWATER TREATMENT IN THREE STEP BATCH TEST.
Nian-Fa Tang*, Yung-Tse Hung*,**Civil Egnineering Department, Cleveland State University, Cleveland, Ohio 44115 *Ohio Environmental Protection Agency, Twinsburg, Ohio

Batch reactor study was conducted to determine the optimal operation condition of potato wastewater treatment by yeast process. In the first step batch test, 9 reactors were operated under design condition. Linear equation was calculated for every sampling time and measured item. The analyzed results of 24th hour was used to compute the step length, and to design the second test. Two reactors were used in the second test. Temperature, pH, TOC (total organic carbon), and TSS (total suspended solids) were selected as variable factors in the tests of first and second step. Two levels of every factor were designed. The third step was designed based on the results obtained from the first and second step test. The third step test was conducted under two variable factors condition, pH and temperature. Results of three step test indicated the best condition for aerobic yeast treatment process is 37 C temperature, and 3.7 pH. The TOC removal loading equations at 24 hour in the first step test and the third step test were determined.

3:30 AEROBIC YEAST BENCH TEST UNDER SPECIAL CONDITION. Nian-Fa Tang*, Yung-Tse Hung**, *Ohio Environmental Protection Agency, Twinsburg, Ohio, **Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

An aerobic yeast bench test was conducted using the best condition found in the three step batch test: temperature 37 C, and pH 4 to 5. Three different volumes of reactors were arranged in a thermal water bath. Three reactor runs were designed to treat high, medium, and low TOC (total organic carbon) concentration potato wastewater. Test results indicated that aerobic yeast process can ba applied to pretreat high concentration potato wastewater. TOC removal efficiencies were from 85.4 to 87.7 % for an influent TOC of 1742 mg/l and hydraulic detention time of 6.3 to 24.6 hours. There was no significant difference of TOC removal efficiency at different hydraulic detention time. High influent organic concentration causes sludge bulking. The effluent total suspended solids (TSS) in shorter hydraulic detention time reactors was less than that for longer hydraulic detention time reactors. Linear relationships and equations were found between TOC removal loading and effluent TOC, influent TOC and hydraulic detention time respectively.

3:45 TWO-STAGE ANAEROBIC-AEROBIC PROCESS FOR MILK WASTEWATER TREATMENT. Jerry R. Taricska*, Yung-Tse Hung**, *Kudukis-Schade & Associates Inc., Cleveland, Ohio 44115 **Civil Engineering Department Cleveland State University, Cleveland, Ohio 44115

This bench-scale laboratory study was conducted to examine the effectiveness of two-stage anaerobic-aerobic lagoon process for milk wastewater treatment with bioaugmentation. The two-stage reactor systems consisted of three pairs of stage 1 anaerobic reactors of hydraulic detention time (HDT) of 6.5 days each. One pair was without media addition, while the other two with 50 or 100 % media addition. Stage 2, aerobic reactors, consisted of three pairs of reactors with HDT of 5, 10, and 15 days. Bioaugmentation was applied to one reactor of each pair in both stages. The two-stage systems were fed with synthetic milk wastewater of TOC (total organic carbon) of 890, 2260, and 3760 mg/l. Results indicated that two-stage systems achieved over 96 % TOC removal. The systems with media addition achieved over 99 % TOC removal. Media addition improved TOC removal of anaerobic reactors of about 16.4 %. Bioaugmentation improved the stage 2 TOC removal efficiency by 9.2 % at low organic loadings.

4:00 BATCH REACTOR STUDY ON BIOAUGMENTATION EFFECTIVENESS. Tong Yu, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115.

A batch reactor experiment was conducted to determine the effect of bioaugmentation on the conversion of insoluble, macromolecular organic materials in wastewater into soluble small molecular organic materials. The starch, soy bean and cheese, representing three main components, carbohydrates, protein, and lipid in general organic wastewater, were used as organic food sources for microorganisms. The bioaugmentation products (LLMO) used in the study were G-1 and S-1. The experiment lasted for 48 hours. LLMO S-1 had better performance than LLMO G-1. But neither S-1 nor G-1 showed any distinct advantage for removal of TOC (total organic carbon) or COD (chemical oxygen demand) from starch soy bean or cheese wastewater if comparing them with bacteria existing in wastewater treatment system naturally.

4:15 PHENOL WASTEWATER BY BATCH ACTIVATED SLUDGE PROCESS WITH BIOAUGMENTATION. Tong Yu, Yung-Tse Hung, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

Batch activated sludge experiment was conducted to deter mine the effect of bioaugmentation on the biodegradation of phenol wastewater. Three types of LLMO (bacterial culture product), a liquid mixed culture bacteria system, were used in the study. Phenol concentration in the wastewater varied from 3.6 to 189.9 mg/l TOC (total organic carbon). Activated sludge was added in one of the control reactors. Both experimental and control reactors were aerated for 7 days. Activated sludge played important role in removing phenol from wastewater. There was no significant difference in phenol removal between the experiment and the control reactor without activated sludge addition. There seemed no advantage in bioaugmentation with LLMO when comparing it with the bacteria existing in the activated sludge reactor with respect to phenol removal.

4:30 METHANE GENERATION AND RECOVERY FROM LANDFILLS. Majid Zarrinafsar*, Yung-Tse Hung*, Ruth Yu-Li Yeh** *Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115 **Chemical Engineering Department, Ming Hsin Engineering College, Hsin Chu, Taiwan.

In recent years there has been a growing interest in the generation of landfill gas. Trend towards regionalization of disposal sites has resulted in development of landfills in metropolitan areas where substantial quantities of refuse can be deposited to great depths. In methane formation process, stabilization of organic wastes is carried by microorganisms under anaerobic conditions. Anaerobic decomposition is a two-stage process. In the first stage, complex materials such as cellulose, fats, proteins and carbohydrates are hydrolyzed, fermented and biologically converted to simple organic materials by a group of facultative and anaerobic bacteria , the acid formers. During the second stage, organic materials are consumed by methanogenic bacteria and converted into methane and carbon dioxide. The methane production is a function of quantity of refuse deposited as well as other factors such as temperature, moistute content, pH. Large regional landfills represent prime candidate for gas recovery.

4:45 POLLUTION CHARACTERISTICS OF LAKE ERIE Majid Zarrinafsar, Yung-Tse Hung, Harbhajan Singh, Civil Engineering Department, Cleveland State University, Cleveland, Ohio 44115

Lake Erie has an area of 59,000 square miles, 58 ft depth, 29-32 inch annual precipation, and 178,000 cu. ft. / sec discharge rate. It has many water quality problems. Phytoplankton, rooted plants and various forms of accelerated enrichment of nutrients. Species can be classified as Oligotrophic to Entropic. Cladophoras are found on rocky shores, blue-green algae in the form of scum, sewage effluents, industrial run-off from agricultural land rich in nutrients affect the various kinds of parameters, contribute inumerable types of pollution and hence, a great menace to environmental health and to public concern. Benthic species are also found and are called pollution-tolerant. Hydrological characters vary with evaporation and discharge geology due to sedimentation. Many kinds of bacteria can also be found which generally affect public health.

R. Ecology
Only Morning at 9:00 am
SATURDAY, APRIL 27, 1991
Townshend Hall 255
Robert Heath, Presiding

9:00 ARBOREAL AND LEAF LITTER SPECIES OF OHIO HARVESTMEN AS NOCTURNAL PREDATORS IN ROADSIDE AND URBANIZED ENVIRONMENTS. GEORGE E. KLEE, Dept. of Biological Sciences, Kent State Univ.-Stark Campus, 6000 Frank Ave., N.W., Canton, OH 44720-7599

During the course of a research study of nocturnal field predation by Opiliones on various arthropods, several species were found to be quite numerous in previously unreported and novel habitats. One unusual type was the bases of lighted interstate highway advertising signs; 3 harvestman species were collected in significant numbers in this "habitat" during regular nocturnal collections made in Stark Co., Ohio, from July through Sept., 1990. The harvestmen apparently were drawn to these areas by the many insects attracted to the signs, which were 50 meters or more from typical mesic hardwood forest habitats from which the most frequestly collected species, Leiobunum vittatum, has usually previously been reported. A laboratory maintainance technique for L. vittatum and another species, Hadrobunus maculosus, will also be described.

9:15 NESTING BEHAVIOR OF OCHROTOMYS NUTTALLI UNDER EXPERIMENTAL FIELD CONDITIONS.
Brett A. Dietz and Gary W. Barrett, Department of Zoology, Miami University, Oxford, Ohio 45056

Nesting behavior of golden mice, Ochrotomys nuttalli, was examined in replicate semi-natural experimental enclosures. Mice were divided into kin and random groups based upon observed field nesting behavior. We hypothesized that kin groups would be significantly larger than random groups and that kin groups would be composed of related individuals. Results, however, did not show significant differences in kin group frequencies versus random group frequencies regarding mice nesting in a group of three or more. Males, however, nested together significantly more in kin groups than in random groups. Corticosterone levels were examined as an indicator of stress. Significant differences were found between male and female mice as a whole and between male and female mice in the kin groups. Differences were not significant, however, between kin and random groups or between male and female mice in the random groups.

9:30 INSECTIVORY: AN OVERLOOKED FACTOR IN THE SODIUM ECOLOGY OF WHITE-TAILED DEER?
KOVACH, Jack, Geology Department, Muskingum College, New Concord, OH 43762

Na is essential to many body functions in animals and is obtained by ruminants through digestive processes. Previous workers have demonstrated low availability of Na in environments of the northeastern and midwestern U.S. and have concluded that the quantities of Na available to white-tailed deer in upland vegetation in these areas are far below those recommended for domestic livestock. Seasonally-occurring "salt drive" (and hence apparent appetite for Na) in white-tailed deer has been shown to be most pronounced in spring and early summer and reportedly is satisfied by consuming, variously, aquatic

plants, materials in natural or man-made salt licks, runoff from highway de-icing salt and/or plants influenced by such runoff. It is suggested here that the restricted salt drive reported in deer during summer and fall, which (improbably) coincides with heavy lactation when females are daily losing large amounts of Na, may be attributable, at least in part, to insectivory. Insects are at peak abundance at that time and, according to literature reports, are enriched in Na by a factor of at least 17 above leaf litter. Although consumption of insects by deer is probably mostly inadvertent, at least one instance of apparently intentional insectivory by deer is recorded in the literature.

9:45 A TEN-YEAR CYCLE IN THE COMBINED HARVEST OF THE HARP SEAL (PHOCA GROENLANDICA) AND THE HOODED SEAL (CYSTOPHORA CRISTATA) BY THE NEWFOUNDLAND SEAL FISHERY, 1900-1948. John F. Wing and Donald J. Glazier, Wittenberg University, P.O. Box 720, Springfield, OH 45501.

Colman (1949) presents a forty-nine year record of fur seal harvest from the Newfoundland Seal Fishery. When the record is subjected to the contingency periodogram test (Legendre et al, 1981), the number of seals caught per man yields significant 10-yr ($p<.05$) and 12-yr ($p<.01$) cycles and a nearly significant 20-yr ($p<.10$) cycle. Monetary share per man yields a significant 10-yr ($p<.05$) cycle and a nearly significant 21-yr ($p<.10$) cycle. Highs were in the latter half of each decade. They probably occur about two years after similar increases in prey biomass: Herring, for example, is an important prey for both seals, and Grainger (1979) has reported a strong 10-yr herring cycle related in turn to cycles in sea-surface temperatures (SST's) and salinity anomolies. We ourselves found seals per man correlated $r=.536$ ($p<.01$) with Newfoundland catch of the Clawed Lobster (Homarus americanus) of two year previous and the latter is very sensitive to SST's (Kanciruk, 1980). Periodograms showed weak 10-yr cycles in H. americanus ($p<.10$ for the maritime provinces). Any regional SST cycles might be part of larger Northern Hemispheric SST cycles described by Folland, Parker and Kates (1984). Their power spectral analysis of zonally-averaged SST's for 1945-1980 yielded a significant 10-yr periodicity.

10:00 FERNALD REVISITED: REPRODUCTIVE SUCCESS AND GROWTH IN AMERICAN ROBINS AT A NUCLEAR REPROCESSING PLANT. David R. Osborne and Frank A. Jones, Department of Zoology, Miami University, Oxford, OH 45056.

To test the hypothesis that bird populations are healthy at a nuclear reprocessing plant we studied the reproductive success and growth rates in American Robins. Nests showed a clumped distribution. Although onsite robins produced normal sized clutches, normal sized eggs and fledged normal numbers of young, robin nestlings were stunted. They showed suppressed growth in four of five prefledgling growth parameters, a pattern similar to that reported for FMPC robins in 1987. FMPC nestlings have significantly shorter bills, shorter wings, shorter primaries and weigh less than do offsite members. Suppressed growth is discussed with respect to biological transport mechanisms, diet quality and food availability.

10:15 **BEHAVIOR AND SURVIVAL OF CAPTIVE-REARED JUVENILE SANDHILL CRANES RELEASED INTO A MIGRATORY FLOCK OF SANDHILL CRANES.**
Theodore A. Bookhout and Richard P. Urbanek, Ohio Cooperative Fish and Wildlife Research Unit, The Ohio State University, 1735 Neil Avenue, Columbus, OH 43210.

During 1988-90, in an effort to develop a reintroduction technique for the whooping crane (Grus americana), we reared 38 greater sandhill cranes (G. canadensis tabida) in isolation from humans and gentle-released them in Michigan's Upper Peninsula. Eight of 16 1988 birds, 7 of 13 1989 birds, and 9 of 9 1990 birds migrated unassisted from the release pen. Of the 1988 birds, 15 of 16 completed their first round-trip migration and survived their yearling summer in the wild. Six of the 15 were found on major wintering areas in Georgia and peninsular Florida in their first winter, 9 of the 15 in their second winter. For 29 chicks released in 1988-89, minimum survival 1 year after release was 83%, and minimum return rate to the natal area was 69%. Isolation-rearing and release techniques should now be developed further with whooping cranes or a similar surrogate that does not already occur on this migration route.

10:30 **MOVEMENTS OF LOCALLY FLEDGED JUVENILE WOOD DUCKS.** T. Kerr, Ohio Cooperative Fish and Wildlife Research Unit, The Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210

Little is known about the premigrational movements of locally fledged juvenile waterfowl. To determine juvenile waterfowl dispersal patterns, I fitted local juvenile wood ducks (Aix sponsa) with radio transmitters and radio tracked them from 21 July to 21 September 1989 (18 females, 8 males) and from 7 July to 30 October 1990 (13 females, 19 males) on the Killbuck Marsh State Wildlife Area in northeastern Ohio. Distances from the natal marsh increased significantly with age; 9 weeks after fledging, they averaged 3.87 km. Mean distance moved on daily feeding flights from the nocturnal roost was 1.2 km (N=26, SD=0.56). Average residence time at a night roost was 21.3 days for females and 13.5 days for males. Early stages of dispersal from the natal marsh consisted of small, incremental steps. Most juvenile wood duck activity prior to mid-September was limited to the wetland complex contiguous to the natal area.

10:45 **MOLT ASYNCHRONY AMONG BREEDING AND NONBREEDING TUNDRA SWANS IN NORTHERN ALASKA.** Susan L. Earnst, Department of Zoology, The Ohio State University, 1735 Neil Avenue, Columbus, OH 43210.

In several species, molt has been shown to be an energetic constraint, the timing of which depends on the timing of other breeding activities. I have studied the ecology of breeding and molting tundra swans (Cygnus columbianus columbianus) on the Colville River delta in northern Alaska. During the summers of 1987-1990, 15 breeding pairs and 97 nonbreeders were captured while in wing molt (July 27 to August 17). Dates of molt initiation were estimated based on the length of the tenth primary at the time of capture. Breeding females initiated molt significantly later than did their mates (2.9 days, $p < 0.05$), whereas nonbreeding females and males did not differ significantly in date of molt initiation. Breeding females began molt an average of 23 days after their eggs hatched; females that hatched nests earlier than average appeared to initiate molt earlier. The adaptive significance of molt asynchrony within pairs will be discussed in relation to the constraints of territorial defense and other breeding activities.

R. Ecology
First Afternoon & Business Mtg at 1:30 pm
SATURDAY, APRIL 27, 1991
Townshend Hall 255
Angela Martin, Presiding

2:00 HOW DENSITY AND DISPERSAL INFLUENCE INBREEDING IN TRILLIUM GRANDIFLORUM. Leslie Stephens and E. Raymond Heithaus. Biology Department, Kenyon College, Gambier, Ohio 43022.

We examined dispersal frequency and distance and genetic structure in two populations of Trillium grandiflorum. We tested for a correlation between density and dispersal parameters. Six sites (three per population, 2m radius) with a range of plant density were mapped in Knox Co., OH. To examine dispersal rates and distances four seed depots per site were randomly placed. Fifteen seeds were placed at each depot and monitored, with two replicates per site. Starch gel electrophoresis was used to examine eight enzyme systems. Dispersal distances were negatively correlated with plant density (means of .41m, .71m, and .93m in high, medium and low density sites.) This may have been caused by higher densities of ant nests in areas with many plants. Removal frequency was uncorrelated with plant density. Recruitment of ants to seed depots was suggested by direct observations and a pattern of seeds being totally removed when depots were discovered. Genetic similarity was analyzed through F-statistics and spatial autocorrelation analysis.

2:15 VARIATION IN POLLEN PRODUCTION OF TWO PRAIRIE GRASSES, ANDROPOGON GERARDI AND SORGHASTRUM NUTANS. Taber D. Allison and Kathleen Cochrane. Department of Plant Biology, The Ohio State University, 1735 Neil Ave., Columbus, OH 43210.

Sources of variation within and among plants in pollen production, a component of male reproductive success, were estimated for two prairie grasses at the Marion Campus Prairie of The Ohio State University. Mean length of anthers (a measure of pollen production) was 4.02 mm for Andropogon and 3.65 mm for Sorghastrum. Anther length varied significantly among individuals in Andropogon, but not Sorghastrum. Anthers in sessile spikelets of Andropogon were significantly longer than anthers in pedicelled spikelets, but the difference was small (4.05 mm vs 3.98 mm, respectively). Andropogon produced 6.2 inflorescences per culm and 2.8 racemes per inflorescence. Both parameters varied significantly among Andropogon individuals. There was no difference in anther length by inflorescence position in this species. In the much simpler inflorescence of Sorghastrum, individuals differed in the number of spikelets per inflorescence. Individuals of both species differed significantly in the number of culms per individual and mean culm height. Annual variation in these parameters of pollen production, and comparisons with Minnesota populations of these species also will be discussed.

2:30 INFLUENCE OF VEGETATIONAL DIVERSITY IN ZEA MAYS L. PLANTINGS ON POPULATIONS OF THE PREDACEOUS ARTHROPOD ORIUS INSIDIOSUS (SAY) (HEMIPTERA: ANTHOCORIDAE). Daniel M. Pavuk & Benjamin R. Stinner, Department of Zoology, Miami University, Oxford, Ohio 45056, and Department of Entomology, O.A.R.D.C., The Ohio State University, Wooster, Ohio 44691.

A two-year study at Wooster, Ohio, examined the influence of vegetational diversity in corn plantings on populations of the generalist predaceous arthropod, Orius insidiosus (Say) (Hemiptera: Anthocoridae). Indigenous weed species were artificially manipulated to provide four different plant communities. The four treatments were corn without weeds, corn principally with broadleaf weeds, corn principally with grassy weeds, and corn with both weed types. The experiment was a 2 x 2 factorial design, with plots set up in a randomized complete block. Significantly more O. insidiosus were caught with a sweep net on corn in broadleaf treatments than on corn in non-broadleaf treatments in 1988 ($P < 0.05$), but not in 1989. Abundance of O. insidiosus on corn was not significantly different between grassy and non-grassy treatments in either year ($P = 0.05$). Future research should test the influences of different weed types, densities and placements in corn plantings on O. insidiosus populations.

2:45 THE EFFECT OF FOREST FRAGMENTATION ON THE GENETIC DIVERSITY AND STRUCTURE OF ACER SACCHARUM MARSH POPULATIONS. S. A. Fore. Department of Botany, Miami University, Oxford, OH 45056.

In many parts of the world, large expanses of forests have been fragmented into small stands resulting in isolation of local populations. Acer saccharum Marsh was used as a model to test the hypothesis that this isolation affects the genotypes and amount of genetic variation in tree populations. Genetic data were collected by starch gel electrophoresis from mature (pre-fragmentation) and juvenile (post-fragmentation) individuals in 20 woodlots from two different isolation categories. Allelic frequency data were compared using Nei's statistics, Wright's F statistic, and Slatkin's estimate of gene flow. The relationship between genetic diversity and stand isolation and differences in allele frequencies and genotypes between juvenile and mature individuals were determined statistically. Preliminary data indicate that the degree of isolation does not affect the percent of polymorphic loci in a stand and that there are significant differences in allelic frequencies among woodlots for the juvenile but not for the mature individuals.

3:00 A COMPARISON OF THE COMPOSITION OF DYSART WOODS IN 1968 AND 1990. Jude Jardine. Dept. of Botany, Ohio University, Athens, Ohio 45701

Dysart Woods is a 50 acre remnant of the pre-European forests which covered most of Ohio. It is located in unglaciated Belmont Co. This paper presents a composition analysis of the NW-facing North Woods and the SE-facing South Woods. The results of this 1990 study are then compared to a composition analysis carried out 22 years earlier (Lafer, 1968). Comparison shows that there are now fewer species in both the North and South Woods. Among the species that occur in both studies the size distribution remains relatively unchanged, as does the mean distance in the South Woods. The mean distance in the North Woods shows a 32% decrease to 15.9 ft. The Rel. Den. and Rel. Freq. ranking has changed in both the North and the South Woods. Quercus alba has dropped from the top three, being replaced by Acer nigra in the North Woods and Nyssa sylvatica in the South Woods. The top three species in Rel. Dom. are the same for the South Woods, although the order changes from: Acer saccharum, Fagus grandifolia, Quercus alba to A. saccharum, Q. alba, F. grandifolia. The ranking in the North Woods changes from: F. grandifolia, Q. alba, A. saccharum to F. grandifolia, Q. alba, Liriodendrom tulipifera with A. saccharum dropping to fourth place. The IV ranking remains unchanged in the South Woods but changes from F. grandifolia, Q. alba, A. saccharum to A. saccharum, F. grandifolia, Q. alba in the North Woods.

3:15 A FLORISTIC STUDY OF A DECIDUOUS WOODLOT "SURVEYING THE UPPERSTORY AND UNDERSTORY TREE CONTENT OF A WOODLOT CONTAINING HIGH SUGAR MAPLE ACER SACCHARUM OCCURRENCES"
Douglas Alan Kinslow
6662 Naldo Lane, Franklin, Ohio 45005-5443

A floristic tree survey of species and density, in a 10.5 hectare deciduous woodlot, in Hardin County, Ohio, was conducted from April 1988 to September 1989. Six 2.5 meter wide equally spaced straight-line transects were placed in selected locations to sample vegetation. Five additional 3 meter wide, 10 meter long transects were located and surveyed throughout the woodlot to assure an equal coverage of the different habitats. Samples of leaves and twigs were collected, identified, and mounted on herbarium sheets. Relative density of each species was calculated. A total of 22 tree species with an average density of 2983 trees/ha occurred in the woodlot. Sugar maple (Acer saccharum), had the highest density followed by wild black cherry (Prunus serotina), shagbark hickory (Carya ovata), and eastern hop hornbeam (Ostrya virginiana). American Beech (Fagus grandifolia), was relatively rare in the woodlot, suggesting signs of a secondary growth Beech-Maple forest.

3:30 THE RESPONSE OF FRAXINUS AMERICANA IN VARIOUS GAP ENVIRONMENTS.
A.G. Billock, Department of Biology, Graduate student, University of Toledo, Toledo, OH 43606

Temperate deciduous forests are subject to disturbances from treefalls. The purpose of this study was to investigate the germination rate and first year biomass of Fraxinus americana in five different canopy microenvironments created by the disturbance.

Seeds were planted at the North, South, East and West edges of a newly created treefall gap, and at the center of the gap. Two control plots were established, one in total sunlight in an open field and one under full canopy cover. The seeds were left to germinate and grow for one season. After harvest, germination rate and success, plus the total plant biomass, leaf area and growth rates were compared for each environment. Preliminary results show that in general, the Fraxinus americana grew faster in the gap centers than in any other microenvironment including the full sunlight.

3:45 FOREST DEVELOPMENT AFTER AGRICULTURE: A TEST OF OLIVER'S (1981) MODEL. James R. Runkle. Department of Biological Sciences, Wright State University, Dayton, OH 45435.

Oliver (1981) developed a model for forest development after major disturbances consisting of four general physiognomic phases: stand initiation (new stems become established), stem exclusion (existing stems develop an all-size structure but no new stems establish), understory reinitiation (some new stems again become established), and old growth (gap-related canopy tree replacement). He further predicts that differences in the stand-initiating disturbance can lead to different dominant vegetation in the same area. This scheme will be tested with data from two newly established (1989-1990), large (0.5 ha) permanent plots in the WSU woods, one in an area released from agriculture about 1955 and one in an area never completely cleared. The former is dominated by Acer, Robinia, and Fraxinus, the latter by Acer and Quercus. The former has more stems 1-24 cm dbh, the latter more stems both < 1 cm dbh and > 24 cm dbh.

4:00 THE EFFECTS OF DRYING TECHNIQUES IN ARTIFICIAL LEAF PACK CONSTRUCTION ON LEAF PROCESSING AND MACROINVERTEBRATE COLONIZATION Patricia Turner and Kelly Harpster, 630 North Fountain Avenue, Springfield, Ohio 45504

Artificial leaf packs are used to provide results indicative of processing in naturally accumulated leaf packs in exposed aerobic locations. In leaf pack construction, scientists vary such factors as leaf pack size, leaf species, drying techniques, and leaf pack enclosure. In this experiment, the effects of oven-drying and air-drying on leaf processing and macroinvertebrate colonization were investigated. Fourteen five-gram packs of Acer saccharinum- six oven-dried at 60C for 48h, six air-dried for 48h, and two controls- were immersed in Buck Creek, Clark County, Ohio for three weeks. Results indicated that drying techniques can affect the dry weights remaining for leaves after processing. No significant differences for macroinvertebrate colonization between manipulations were found.

4:15 Autumn Leaf-fall as a Source of Trihalomethane Precursors. Angela Martin and R.E. Carlson. Department Biological Sciences, Kent State Univ., Kent, Ohio 44242

Trihalomethanes (THMs) form when chlorine reacts with certain naturally occurring organic molecules (THM precursors) during the disinfection of drinking water. THMs are believed to have significant mutagenic properties. The elucidation of THM precursor sources is important because source management may lower costs and increase effectiveness of in-plant treatments. This study investigated the importance of organic compounds released from leaves as THM precursors.

The loading of leaf material into Lake Rockwell, a drinking water reservoir in northeastern Ohio, was investigated for the autumn leaf-fall of 1989. Leaf influx from the primary tributary flowing into the reservoir was measured 4 days a week by collecting particulate material in a 1mm mesh seine net over a 10 minute period.

The THM precursor release rates from two different leaf types, a rapidly decomposing species and a more recalcitrant species were determined in the laboratory. The total loading of THM precursors from leaf material entering the upper portion of the reservoir was estimated by multiplying laboratory derived release rates per gram dry weight with estimated leaf influx.

4:30 DIETARY UPTAKE OF HEAVY METALS BY THE LEAST SHREW, CRYPTOTIS PARVA. Christopher C. Brueske and Gary W. Barrett, Department of Zoology, Miami University, Oxford, OH 45056

Heavy metals from municipal sewage sludge have been shown to accumulate in detritivores, producers, and primary consumers. Heavy metal bioaccumulation in secondary consumers, however, remains poorly investigated. In order to assess rates of heavy metal transfer in an old-field community food chain, six adult least shrews (Cryptotis parva) were fed a diet containing earthworms collected from plots treated with municipal sludge for eleven years. Six adult C. parva were fed a diet containing earthworms collected from uncontaminated soil to serve as the control group. Cadmium, copper, lead, and zinc concentrations in the liver, kidney, and digestive tract of each experimental animal were determined by atomic absorption spectrophotometry. Significantly higher concentrations of all four heavy metals were detected in liver tissue of shrews fed the contaminated diet. A significantly greater amount of Cd was also detected in digestive tract tissue of shrews fed earthworms collected from the sludge-treated plots. The body mass of the animals fed the contaminated diet was reduced significantly during the experimental period; this loss was attributed to Pb toxicity. It appears that heavy metals from sewage sludge can be transferred through higher trophic levels and may represent a hazard to secondary consumers.

4:45 BIOREMEDIATION - AFFORDABLE POLLUTION CONTROL Jo Davison, Research Director
Lambda Bioremediation Systems, Inc.
2840 Fisher Road
Columbus, Ohio 43204

The treatment of polluted soil and water resulting from acid mine drainage, industrial waste, landfill leachate, underground storage tanks and agricultural run-off has proven very challenging. Many treatment methods have been employed with variable results, some of which have been negative. The use of natural biological methods, or bioremediation, has proven successful at sites as listed above.

The Lambda method is based upon the acceleration of natural biological and physical processes which have been present on Earth for a billion+ years. Using these principles, Lambda has developed a process whereby biologically active microbes enhance chelation and the deposition of heavy metals and other minerals in the sub-soil.

These concepts have been successful at the bench and in field applications. Heavy metals in acid coal mine drainage sites in WV and PA have been significantly reduced. Ponds at a ME country club were reduced from toxic levels to drinking water standards. Both soil and water pollution at the sites have shown rapid and sustained recovery with little or no sludge production and no deleterious environment effects.

R. Ecology
Second Afternoon at 2:00 pm
SATURDAY, APRIL 27, 1991
Townshend Hall 256
David Francko, Presiding

2:00 PHYTOPLANKTON PRODUCTIVITY VERSUS cAMP: AN EMPIRICAL MODEL. D. A. Francko and S. H. Al-Hamdani, Department of Botany, Miami University, Oxford, OH 45056.

A linear regression model relating log-transformed dissolved cAMP concentration to epilimnetic phytoplanktonic photosynthetic carbon assimilation (PCA) rates was developed in cyanophyte-dominated Sangre Isle Lake, Oklahoma. This model suggests that in situ PCA rates are a predictable function of lakewater dissolved cAMP content. During the 1990 season cAMP removal/readdition experiments were conducted on Sangre Isle Lake and four lakes in Southwestern Ohio to test this thesis. Removal of cAMP from lakewater resulted in an increase in planktonic PCA rates. Readdition of cAMP to levels below, above or equivalent to original levels induced a linear decrease in PCA. The productivity of unperturbed control samples fell within the 95% confidence interval of the regression. In Ohio lakes (three dominated by green algae and one by chrysophytes), cAMP removal/addition also resulted in PCA rate alterations and a close approximation of nominal PCA rates based on extant cAMP. The magnitude of response was smaller than in the blue-green-dominated Oklahoma system, suggesting that cAMP-mediated PCA rates may be dependent on the type of phytoplankton association present in a given system.

2:15 **FRACTIONATION OF PHYTOPLANKTON FROM BACTERIOPLANKTON IN LAKE WATER USING FILTERS AND ISOPYCNIC SEDIMENTATION.** R.T.Heath, R.Garono, Department of Biological Sciences, Kent State Univ., Kent, OH 44242.

Separation of bacterioplankton from phytoplankton is essential for investigation of nutrient fate in freshwater lakes. Generally this is accomplished by size-selective filtration. We examined the notion that this provides a reasonable separation of these organisms by using track-etched polycarbonate filters to filter mixtures of calibrated fluorescent beads and natural planktonic communities. We find that filtration successfully retains particles greater than the nominal pore size, but filters also retain significant numbers of particles smaller than the nominal pore size. We found that rapid swirling of the mixture did not improve the separation efficiency. We recommend that even when filters are calibrated with fluorescent beads the results of size-selective filtration be interpreted with caution. Using Percoll we found that isopycnic sedimentation can separate bacteria from many algae, but that separations based on these results also should be interpreted with caution.

This study was supported by Ohio Sea Grant.

2:30 DISTRIBUTION AND ABUNDANCE OF THE MICROBIAL BIOTA OF AN ACID BOG LAKE. R. Meyers, S-J. Hwang, and T.R. Heath, Department of Biological Sciences, Kent State University, Kent, OH 44242.

Distribution and abundance of the microbial biota of Triangle Bog Lake, an acid bog lake in Portage County, were observed during the summer of 1990. Samples were collected at one meter intervals throughout the water column and at several surface sites in the mat. Enumeration was

done on concentrated preserved samples. All samples were preserved in 4% formaldehyde. Sucrose was added to the zooplankton samples to prevent distortion. Bacteria were stained with acriflavin, algae were fixed with Lugol's fixative. Bacterial numbers were consistently high (10^8 cells per mL) with less than an order of magnitude variation among sites. Algal numbers were generally greater than 10^4 cells per mL. Many heterotrophic algal species were present: the dominant species was Gonyostomum semen. The open water was dominated by rotifers, while the mat community contained cladocerans. Differences between the community in the mat and in the open water were examined.

2:45 BACTERIOPLANKTON ABUNDANCE AND ACTIVITY I N SANDUSKY BAY. S-J. Hwang and R.T.Heath. Dept. of Biological Sciences, Kent State University, Kent, OH 44242.

The role of bacterioplankton in planktonic community structure and function is not well understood. Growing information has shown that bacterioplankton are not only important in detrital decomposition but also may be important in nutrient dynamics at the base of the food web. The development of planktonic communities in Great Lakes coastal wetlands is also not well understood. The purpose of this study was to examine the abundance and functional importance of bacterioplankton in Sandusky Bay, a coastal wetland through which Sandusky River water passes before entering Lake Erie. Bacterial populations, enumerated following acriflavin staining, reached a maximum in the eastern basin of the bay then decreased as the water moved into Lake Erie. Lake Erie surface waters generally had 3×10^6 cells/mL, while surface waters in Sandusky Bay contained greater than 3×10^7 cells/mL in summer. Bacterial productivity and metabolic activities were greatest at stations sampled within the Bay. We especially noted that bacteria were significant in the uptake of phosphate and in the hydrolysis of dissolved organic compounds.

3:00 **THE FUNCTIONAL ROLE OF THE SANDUSKY BAY COASTAL WETLAND IN PHOSPHORUS BIOAVAILABILITY.** Ralph J. Garono and Robert T. Heath, Department of Biological Sciences, Kent State University, Kent, OH 44242.

The purpose of this study was to investigate the hypothesis that bacterioplankton outcompete phytoplankton for available phosphate, especially under severely P-limiting conditions; as algae are deprived of phosphate by bacteria, they depend on dissolved organic P (DOP) for growth. We conducted this study along a continuum of P-availability in Sandusky Bay and near-shore zones of Lake Erie. Eleven samples were taken at monthly intervals during the summer of 1990 along a 40 km transect made from the Sandusky River into Lake Erie. Using radiometric procedures, phosphate and DOP concentrations and their rates of uptake by bacteria and algae were measured at each station along the transect. As phosphate availability decreased along the transect, bacterial uptake of phosphate increased, algal uptake of DOP increased, but algae continued to depend on phosphate for growth.

This study was supported by Ohio Sea Grant.

3:15 INTERPOPULATION DIFFERENCES IN EPIBIONTIC PROTOZOAN INFESTATION OF A FRESH-WATER ARCTIC COPEPOD. James Engman. Dept. of Biological Sciences, University of Cincinnati. Cincinnati, OH 45221-0006.

Heterocope septentrionalis (Calanoida:Copepoda) from lakes and ponds in northern Alaska were found to support infestations of a suctorian Protozoan (Tokophyra sp.). Percentage of copepods infested varied from 9% to 97%, and displayed a significant negative correlation with size of the body of water in which the copepods were found. Most Tokophyra were found on the urosomes and posterior segments of the metasomes. Epibiontic protozoans have previously been reported attached to copepods and other crustaceans, but this is believed to be the furthest north occurrence of such a relationship yet reported. Initial investigations suggest that high levels of protozoan infestation on pond Heterocope relative to lake Heterocope may reflect differences in trophic status of these bodies of water and/or variations in feeding behavior of the copepods in different systems. Influence of trophic status on infestation is being examined in fertilized and control lakes.

3:30 ECOLOGY AND FAUNA OF THE CAVES OF COSTA RICA, CENTRAL AMERICA: A PRELIMINARY REPORT. Hobbs III, H. H. Biology Department, Wittenberg University, P. O. Box 720, Springfield, Ohio 45501-0720.

During the past two years (1989, 1990) the efforts of the joint Asociación Espeleológica Costarricense - National Speleological Society Expedition have resulted in the discovery of numerous caves in the Neily region of southern Costa Rica. This karst area is situated in the Provincia de Puntarenas and is part of the southwest Pacific lowlands and adjacent foothills area. These ongoing efforts have included not only exploration and survey of caves but also have entailed hydrological, geological, and biological studies of these karst features. Fourteen caves in this tropical setting were sampled for biota and five phyla, represented by at least 11 classes and 27 orders are recognized. The actual number of species observed/collected in these caves has not yet been determined and new species descriptions are in various stages of completion.

3:45 A COMPARATIVE STUDY OF CAVE AND SURFACE STREAM DRIFT. Cathy L. Pederson and H. H. Hobbs III, Biology Department, Wittenberg University, P. O. Box 720, Springfield, Ohio 45501-0720.

This investigation provides information on several aspects of the drift of benthic macroinvertebrates in a cave and surface stream and represents only the second study to demonstrate drift occurring in any cave ecosystem. Biological and physicochemical data were gathered from a stream in Bat Cave and its surface effluent in Carter County, Kentucky. Data were obtained at three hour intervals for twenty-four hours on seven occasions during the summer of 1990. Drift, primarily of the amphipod Gammarus minus, was demonstrated in both habitats, yet no physicochemical parameters were shown to vary or to influence drift significantly within the cave. Although drift occurred in both epigean and hypogean situations, no peak times were found for cave drift. However, a significantly higher number of macroinvertebrates drifted in the surface stream with the maximum number of organisms moving during the early evening.

4:00 A SAMPLING OF BENTHIC MACROINVERTEBRATES OF THE KOKOSING RIVER IN 1980 AND OTHER SELECTED ECOLOGICAL ASPECTS - Gary L. Burkholder, Associate Professor of Biology, Mount Vernon Nazarene College, Mount Vernon, OH 43050

In the summer 1980 (24 and 25 July) and again in early autumn (16, 17 and 20 September) composite Surber samples were taken from eight stations located along the Kokosing River, Knox County, OH. These were identified to the lowest taxanomic level possible. The number of differnt benthic macroinvertebrate taxa present in the river were 61 and 55 for the July and September sampling periods. The total number of organisms per square meter were 4248 and 1959 for July and September samples. The Sahnnon-Wiener diversity index for the two samples were 4.13 and 3.75 for July and September. The biotic index was 4.10 and 3.71 for July and September. These indices indicate that the Kokosing River has a high ecological diversity when compared to other rivers in the state and low pollution levels. The most abundant groups of organisms per square meter were Diptera 34.7% and 27.9%, Trichoptera 25.0% and 37.6% and Ephemeroptera 18.9% and 18.8%. The number of taxa and numbers of organisms per square meter show a trend of being higher in the upstream portions of the river than downstream.

4:15 COLONIZATION SEQUENCE OF DEFAUNATED SUBSTRATES BY BENTHIC MACROINVERTEBRATES. Kevin S. Simon and Eric C. Martin. 110 W. College Springfield, OH 44504.

Baskets of defaunated substrate were placed in a riffle area of Buck Creek, Clark County, Ohio. The sequence of macroinvertebrate colonization and trends in species diversity, species richness, and total number of colonizers were investigated over a six week period. Hydropsychidae and Chironomidae were the initial colonizers and remained dominant throughout the study. Species diversity fluctuated, while species richness and total number of colonizers increased throughout the study. Macroinvertebrate communities in the baskets did not reach a state comparable to samples of surrounding substrate, suggesting that six weeks was insufficient time for the defaunated substrates to reach an equilibrium community.

4:30 STATUS OF THE CHANNEL DARTER (PERCINA COPELANDI) IN THE UPPER AND MIDDLE OHIO RIVER. Rob J. Reash, American Electric Power, Environmental Engineering Group, 1 Riverside Plaza, Columbus, OH 43215

The channel darter (Percina copelandi) is designated an endangered species by the Ohio Division of Wildlife. Though populations in inland waters are small and are generally confined to Lake Erie tributaries and the mainstem Muskingum River, recent collections have indicated successful establishment of this species in the upper and middle Ohio River. Fishery collections conducted as part of the Ohio River Ecological Research Program have documented the presence of larval and/or adult channel darters near three coal-fired power plants (RM 55, 76 and 260). Most darters are collected by near-shore seining or deep-water trawling, suggesting multi-habitat use of these fish in the Ohio River. Increased frequency of channel darter collections indicates the presence of suitable habitat in the Ohio River; improvements in water quality can be inferred based on reinvasion by this species and the composition of the entire fish assemblage. The Ohio River Ecological Research Program is sponsored by American Electric Power, Ohio Edison Company, Ohio Valley Electric Corporation, Cincinnati Gas & Electric Company and Tennessee Valley Authority.

4:45 CYCLES IN LAKE ERIE POPULATIONS OF THE BLUE WALLEYE, STIZOSTEDION VITREUM GLAUCUM, FOR THE YEARS 1915-1959. John F. Wing and Donald J. Glazier, Wittenberg University, P.O. Box 720, Springfield, Ohio 45501.

Populations of the Blue Walleye, Stizostedion vitreum Glaucum, originally were abundant in Lakes Erie and Ontario; but by 1915 they began to fluctuate greatly and they became extinct, the last specimen being taken in 1965 (Campbell, 1987). Commercial catches between 1915-1959 reported by Parsons (1967) show 2-10 fold fluctuations across decades with highest production usually in the middle of each decade: 1915, 1925, 1936, 1944 and 1955. Contingency periodogram analyses (Legendre et al, 1981) show significant 10-yr ($p<.05$) and 21-yr ($p<.01$) cycles in U.S. harvest, a significant 12-yr ($p<.05$) cycle in Ontario harvest, and significant 11-yr ($p<.05$) and 22-yr ($p<.05$) cycles in the combined U.S.-Canadian harvest. The latter cycles match periodicities obtained in Cohn and Robinson's (1976) spectral analysis of Lake Erie and other Great Lakes' water levels (1, 8, 11, 22, and 36 years). Peak walleye harvests seem to occur 2-3 years after peaks in lake water levels. Higher water might have caused greater or richer spawning areas for both the Walleye and its prey including higher oxygen concentration and lower pollution in those areas, thus inducing the 10-12 year and 20-22 year harvest peaks.

R. Ecology
POSTER SESSION
SATURDAY, APRIL 27, 1991
University Hall Lobby

Board M @ 10:00 AN ECOMORPHOLOGICAL ANALYSIS ON PLETHODONTID SALAMANDERS, Natarajan, Meena Department of Zoological and Biomedical Sciences, Irvine Hall, Ohio University, Athens, OH 45701.

Multivariate analysis of 12 morphometric variables were used to describe patterns of size and shape among 7 species belonging to the genus Plethodon. 15 external traits were recorded on preserved specimens; all morphometric variables were log transformed and adjusted for the effects of body size. Information was also obtained regarding microhabitat variation. The similarity in overall morphology and ecology among the different species may reflect a common evolutionary history rather than adaptation to external environments. In order to distinguish between the different species, PCA and multiple discriminant analysis were used. Based on PC I, which explains 81% of the variation it is possible to cluster most of the species. The distance between the ankle joint to the tip of the longest toe in the hind limb had the highest loading (0.42) for this component. The first canonical function of the discriminant analysis explains more than 90% of the variation between the species. Inter nasal distance and distance between the ankle joint to the tip of the longest toe in the hind limb were the variables that maximized the differences between the groups. Correlations between ecological and morphometric variables were detected using canonical correlations analysis. The first canonical correlation coefficient was 0.95 indicating a high correlation between ecology and morphology.

S. Info. and Library Sciences
Only Morning & Business Mtg. at 9:00 am
FRIDAY, APRIL 26, 1991
Main Library 122
Mr. Chris Miko, Presiding

9:00 INTEGRATION OF TECHNICAL AND PUBLIC SERVICES FUNCTIONS: A Research In Progress Report, Rajinder Garcha, Carlson Library, University of Toledo, OH 43606-3399

In recent years there have been suggestions in the periodical library literature that due to various factors (e.g. economics, technology, etc.), the traditional bifurcated organizational structure of technical and public services in academic and research libraries is changing. In the Fall of 1984, 117 ARL members were surveyed to determine the extent that research libraries have reorganized the staff. As a result of automation, dual function positions were reported by 13 libraries, and job rotation reported by other 4 (SPEC Kit, #112). This study ascertains the current status of academic libraries with respect to organizational structure and the extent to which traditional technical and public services are maintained. For this present study, 145 libraries were surveyed to compare libraries with large collections of over one million volumes to those with much smaller collections. The result of this survey shows the trends and reasons for integration of technical/public services functions, if any, and whether these results should have an impact on library school curricula.

9:15 INDEX TO OHIO GEOLOGIC QUADRANGLES. Edward J. Hall, Kent State University, Map Library, 410 McGilvrey Hall, Kent, Ohio 44242

One useful and productive method of locating maps and charts for research on Ohio geology is to use one of the United States Geological Survey's geologic map indexes. The latest geologic map index was issued in 1979 and revised and updated in 1987.

However, map librarians have found that geologic map indexes arranged by geologic quadrangle name are often easier to use and to update. This index covers geologic maps and charts of Ohio that were published in several U.S. G.S. and state series.

Only maps from the U.S.G.S. "L" series (Land Use and Land Cover) have been excluded. This index includes maps that were published by the Ohio Geological Survey and the Indiana Geological Survey. These series include important details of geologic maps of the state of Ohio. This index has two parts. The first part lists small scale geologic maps of all of Ohio in alphabetical order by state, region and by title. The second part indexes geologic maps of Ohio that have scales of 1:125,000 or larger. This part is arranged in alphabetical order by U.S.G.S. 7.5' and 15' topographic quadrangle names.

The principal indexing unit is the 7.5' quadrangle name.

9:30 IS ANSI OR CONTINUING ENTROPY THE ANSWER TO EXPANDING DIVERSIFICATION OF U.S. STANDARDS?
Robert J. Rittenhouse
Physical Sciences and Engineering Bibliographer, Science and Technology Library ASC104H, The University of Akron 44325-3907

As buyers, citizens, designers, or researchers inquire for answers to technical, safety, design, or personal problems among U.S. standards, can any one group provide complete current U.S. standards? Many vendors such as Information Handling Services (IHS), National Standards Association (NSA), Naval Forms and Publications Center (NFPC), IEEE, ASTM, SAE, and others provide extensive holdings of U.S. standards including online databases. Among these groups is the American National Standards Institute which is a major approval agency and includes many technical society standards in its annual catalog. However, the vast majority of all U.S. standards are never approved by ANSI, and do not need ANSI approval to have validity for the users. While the contribution of ANSI is important, the three major national organizers of most U.S. standards are IHS, NSA, and NFPC. The structure of U.S. standards will likely remain pluralistic with a small number of large vendors and/or producers. A much larger number of smaller technical society producers and/or government agencies will provide the great variety of standards.

10:00 LENGTH OF LIBRARY CONTRACT: A Research In Progress Report. Rajinder Garcha & Kathleen Voigt, Carlson Library, University of Toledo, Toledo, OH 43606-3399

Librarians with faculty status must usually meet similar standards for promotion and tenure as teaching faculty; however, many librarians feel that they do not have the flexibility as teaching faculty if they have 12-month contract. It would be helpful to have more research done on experiences in various university libraries which have faculty status.

Since the time factor is a big issue with a faculty status, have some libraries gone with a shorter contract? We have conducted a survey to gather data pertaining to the length of contract. Administrators as well as reference and technical services librarians of the American Research Libraries have been asked to express their opinions and beliefs of 12-month contract or shorter, the advantages and disadvantages of each to the individual, the library, and the university.

In reading the literature on the subject and making phone calls to various universities it was discovered that earlier surveys are outdated. We are hoping that the current survey results will reflect the state of the art in regard to length of library contracts.

10:15 **CATALOGING ON INNOVACQ AND NOTIS; AN EVALUATION.** Dale Ebersole, Jr. Carlson Library, University of Toledo, Toledo, Ohio 43606.

The comparison of cataloging between two automated systems is useful. Since serial records often need updating, their requirements are more complex than that of a simple monograph. All evaluations and examples are based upon such serial records. The ease with which records may be added to or removed from the database is noted. Identical keystrokes are to be used transfer records in, but deletions are more complicated. Editing records on Innovacq and Notis systems pose a number of choices. Significant features of each system's editor are highlighted. Differences in search strategies can create difficulties, especially, when used in conjunction with a bibliographic utility such as OCLC. Both Innovacq and Notis are relatively easy to use, and have definite advantages over the former manual system. It is much easier and more accurate to make a change in one or two places in an electronic record than to pull, change, and refile a set of cards.

S. Info. and Library Sciences
Afternoon & Business Mtg. at 1:30 pm
FRIDAY, APRIL 26, 1991
Main Library 122
Mr. Chris Miko, Presiding

2:00 EFFECTIVENESS OF AN AUTOMATED TUTORIAL FOR POINT-OF-USE CD-ROM INSTRUCTION - SOME PRELIMINARY OBSERVATIONS.
Bruce Leach, Biological Sciences Library, Ohio State University, 1735 Neil Ave., Columbus, Ohio 43210

The Biological Sciences Library uses AQUATIC SCIENCES AND FISHERIES ABSTRACTS (ASFA) and LIFE SCIENCES COLLECTION (LSC) on CD-ROM. Despite the user-friendliness of the software, most first-time users require or request some instruction before searching. Before this project, 30 minute workshops and individual instruction on demand were the two methods offered. Due to staffing patterns, high quality instruction on demand is not always available. The problem was to provide high quality point-of-use instruction requiring little or no staff intervention. A four-part BASIC program was written to introduce search strategy/logic, and to simulate subject searching, displaying results, and changing disks. Using a fixed strategy developed in the first part of the program, users are shown how to enter a subject search, then drilled. Occasional quiz questions reinforce important concepts. Since the tutorial was added to the CD-ROM workstation in Fall 1990 first-time users of ASFA and LSC have been surveyed. Although the sample size is small, surveys suggest students using the tutorial require no more additional help than those taught by library staff.